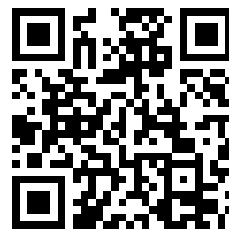
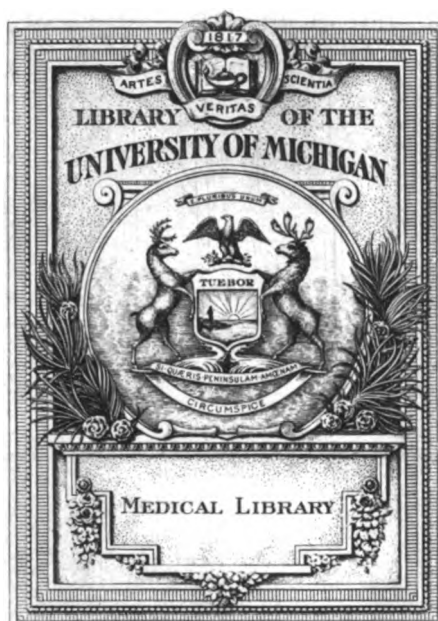

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

GoogleTM books

<https://books.google.com>







610.5

G79

A74

j

Mr. Allen. Ray

Volume 12. A. McC.

Journal
of the
Royal Army Medical Corps

Journal

OF THE

St Brit. Army

Royal Army Medical Corps

EDITED BY

LIEUT.-COLONEL R. H. FIRTH

ROYAL ARMY MEDICAL CORPS.

VOL. I.

July—December, 1903.



JOHN BALE, SONS & DANIELSSON LTD.

OXFORD HOUSE

83-89, GREAT TITCHFIELD STREET, OXFORD STREET, W.

Medical
Library
12.15.30
23007
20V

VOLUME I.

JULY, 1903.

No. 1.

Journal
of the
Royal Army Medical Corps.

L'ENVOI.

THE issue of this Journal is the realisation of a hope of many years. The necessity for such a periodical has long been recognised by the medical officers of the Army. It is not, as many suppose, a new idea. As long ago as 1864 a meeting was held at Netley to consider the question, and the establishment of a Journal was resolved upon, and its scope, character and form were decided upon even to the most minute detail. The whole question was thought to have been settled and the greatest satisfaction was felt. But an old-world official opposition, together with "rules and customs of the service," effectually killed the proposal at its birth, and though many efforts have been made since then to revive it they have all been without success.

After the recent war the Medical Service of the Army was made the subject of consideration by a Reorganisation Committee, and among many recommendations made by that Committee to the Secretary of State for War, one of the most important was the establishment of an Army Medical College in London. That, of course, meant the breaking-up of the School at Netley, and probably the removal of its Library, consisting of some two thousand volumes, to London. It was decided to transfer the School at once, and, pending the construction of the permanent buildings, temporary accommodation was found in the Conjoint Board Laboratories on the Thames Embankment. It is hoped, however, that there will be no delay in proceeding with the permanent buildings, as the

establishment of the College in London is of paramount importance. The production of a Journal devoted to matters of professional and scientific interest is also felt to be a necessity, and it has been decided to put the Library and Journal under the management of a Committee to be called the Library and Journal Committee, to be appointed annually and to consist of six members representative of Headquarters Staff, the Army Medical College and the Advisory Board, with an officer on retired pay and one from the auxiliary forces.

The Secretary of State has sanctioned an increase to the annual grant to the Library, and also the appointment of a Librarian, preferably a retired Officer of the R.A.M.C., who shall receive £100 a year in addition to his retired pay.

The Journal is to be edited under the direction of the Library and Journal Committee, and the Editor appointed on its recommendation. Major Firth has been appointed for six months from July 1, 1903.

The Journal it was agreed should embrace : (1) Original articles written by officers of the Royal Army Medical Corps and others. (2) Bibliographical notes on articles of importance and interest to the military services. (3) Reprints and translations from military, medical and other journals. (4) Official gazettes and official information generally bearing upon the Army Medical services.

The enlargement of the Netley Library, its removal to London, and the appointment of a competent Librarian, are considered necessary steps to secure the creation of facilities for giving bibliographical assistance to officers engaged in investigation or research, and it is hoped that the Journal conducted upon the foregoing lines will enable medical officers, wherever they may be serving, to keep in touch not only with what is going on in the British Service, but with the advances and changes that are being made in other armies. The Committee will be glad if officers will express to it their views as to the general management and contents of the Journal ; but it must be clearly understood that its pages will not be open to controversial correspondence or to items of social or personal interest other than what is official.

Officers who have made special studies of any subject are requested to give their names to the Committee, and it is hoped that those who have a knowledge of foreign languages and are capable of undertaking the work of reviewing and extracting

information from foreign publications will send in their names for work of that description in connection with the Journal.

There is surely every ground for expecting that the officers of the Corps will not hesitate to support this effort to maintain a high standard of professional and scientific attainment in the Army Medical Services. Indeed, this has been shown by the number of officers who have become subscribers. It comprises the great majority, and there is reason to believe that temporary difficulties connected with field service and the fact of their being stationed in out-of-the-way places are the causes which have kept back the few who have not yet subscribed. It is to be hoped, and it is certainly very much to be desired, that not one officer will be found in the Corps who does not approve of the objects with which the Journal has been founded, or who will refuse it his strongest support.

That men who have had unusual experiences and have had much of interest to tell their brother officers and the scientific world generally have been kept from doing so, has been in a great measure due to the fact that all communications, however great their interest, were consigned to the limbo of the Army Medical Department Report. Some lethal influence seems to have lurked in the pages of that official publication, for everything that entered them was suffocated at its birth and annihilated. No future existence was possible for anything overtaken by that misfortune.

It is believed, therefore, that officers will hail with joyous appreciation the appearance of this Journal, that they will eagerly take advantage of the opportunities which it will afford them of interchange of ideas on the many subjects of importance to individual officers as well as to the Service to which they belong. That which has been longed for for years has been at last realised. We have got the Journal we have wanted ever since we entered the Service, and upon us lies the responsibility of its proper bringing-up during its youth and of its success and usefulness in its maturer years. Earnestness and enthusiasm are essential to secure success. "Without earnestness there is nothing to be done in life." "Nothing great was ever achieved without enthusiasm." It surely can be relied upon that there will be no lack of either earnestness or of enthusiasm; that not a single officer will forget his share of the responsibility for the complete success of the Journal. Its reputation will be dear to every one of us. "A good name is better than precious ointment," and, as the honour and the good

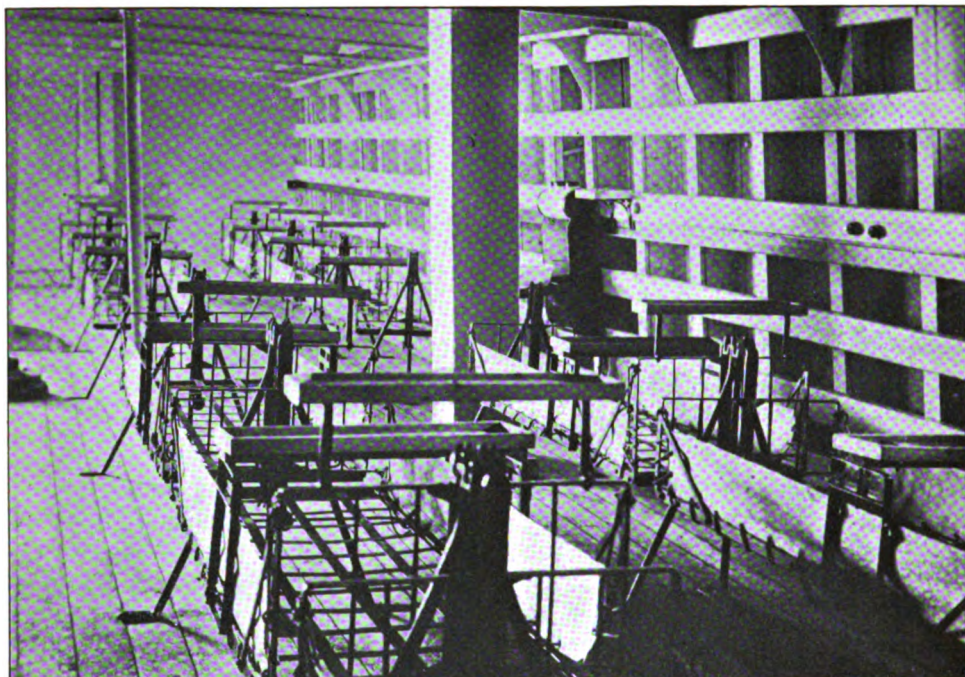
name of our profession and of the service to which we are all proud to belong should ever be our most anxious care, as well as our most precious possession, we must use every endeavour to make each and every issue of the Journal worthy of us as members of that profession and as officers of the Army Medical Service.

W. TAYLOR.

D.G.

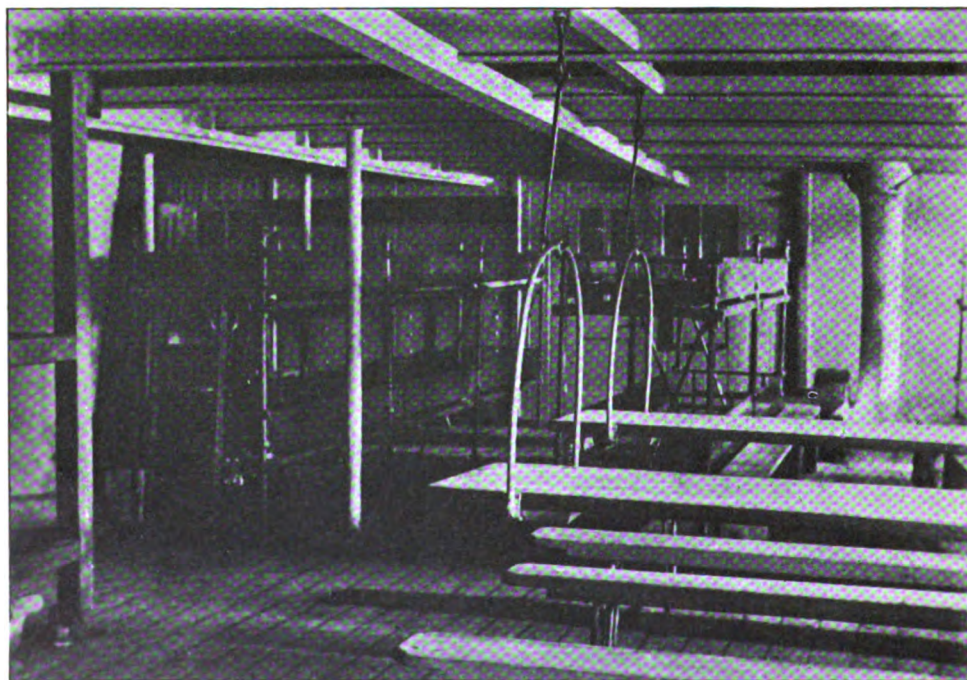
PART OF MAIN HOSPITAL, TRANSPORT "SICILIA."

Showing swinging cots in single tier with cot tables; also M.O.'s wash-stand.



PART OF CONVALESCENT WARD, TRANSPORT "DILWARA."

Showing double tier cots and mess tables.



Original Communications.

A REPORT UPON HOSPITAL ARRANGEMENTS ON BOARD TRANSPORTS.

BY CAPTAIN G. B. STANISTREET

Royal Army Medical Corps.

CONSIDERABLE difference of opinion appears to exist amongst various authorities, both naval and military, as to what hospital arrangements are essential to meet the requirements of sick and wounded soldiers on board transports, and the want of some guide as to what is required is much felt, for the very meagre description given in the Admiralty Transport Regulations of the specifications for fitting hospitals on board transports can hardly be regarded as a guide to modern requirements. Having had, as Embarkation Medical Officer at Southampton, unusual opportunities of familiarising myself with the difficulties and essentials of this question, I submit the results of my observations, in the hope that they may prove of some use to those called upon either to fit or inspect hospitals on board transports.

Accompanying this Report are plans of some of the best arranged hospitals, also some photographs which will, I hope, be of service in elucidating the descriptions given of the various hospital arrangements.

In this Report I do not intend dealing with the "fittings" of the special hospital ships employed in time of war, but only with the hospital arrangements on board the transports employed for the conveyance of troops between England and her foreign possessions, and for the homeward passage of invalids sent from abroad. I propose discussing the subject under the following heads, and do not intend taking up the question of the medical and surgical equipment of these hospitals, as its supply appears to be already sufficient and satisfactory :—

- (1) The class of hospital accommodation to be provided, *i.e.*, whether in cabins or in an open hospital on a cot-deck.
- (2) Facilities for embarking and disembarking helpless patients.
- (3) The position of the cot-deck hospital.
- (4) The cots and their arrangement.
- (5) Cupboards for patients' medicines and medical comforts.

- (6) Ice-chests.
- (7) Mess-table accommodation.
- (8) Messing accommodation for the detachment of the Royal Army Medical Corps.
- (9) Pantries.
- (10) Electric kettles and saucepans.
- (11) Supply of drinking water.
- (12) Appliances for heating and lighting the hospital.
- (13) Lavatories, bath-rooms and w.c.'s.
- (14) Wash-places for use of the medical staff of the ship.
- (15) Means for disinfecting and washing hospital clothing.
- (16) Dispensary and office.
- (17) Hospital store-rooms.
- (18) Ventilation.
- (19) Means for isolating cases of infectious disease.
- (20) Accommodation for sick women and children.
- (21) Accommodation for sick officers.
- (22) Accommodation for lunatics.
- (23) Miscellaneous points.
- (24) Hospital accommodation in troop freight ships.

The first and one of the most important questions for decision is :—

I. The Class of Hospital Accommodation to be Provided, i.e., whether in cabins, or in an open hospital on a cot-deck.

The regulations for H.M.'s Transport Service are rather at variance on this point, for in the "specifications for fitting" hospitals on transports it is laid down that "a sufficient space will be appropriated in the most suitable part of the vessel for the hospital, and screened off with canvas screens;" while in Appendix I. it directs that "when it is possible to utilise cabins on upper or main decks as hospital berths, it should be done."

Now I do not think cabin accommodation for the treatment of serious medical or surgical cases can be too strongly condemned, and my reasons for this opinion are as follows :—

- (1) The extreme difficulty as well as the great discomfort and even danger to helpless patients involved in conveying them from their cabin berths to the main alleyways before they can be placed

on stretchers for disembarkation. A similar difficulty is experienced in embarking helpless patients.

(2) Under the circumstances just stated it is impracticable to have cot cases taken on deck for change and fresh air.

(3) A patient in a cabin berth can only be approached from one side, or at the most from one side and one end, for purposes of examination and treatment, which are in many instances carried out with great difficulty.

(4) In cabins, berths are usually arranged in two tiers, an obviously objectionable arrangement, especially in cases of bowel diseases or sea-sickness.

(5) The great difficulty experienced by a very weak patient in getting into and out of an upper berth for purposes of nature, &c., especially when there is a heavy sea running.

(6) The difficulty of securing efficient ventilation in cabins.

(7) The increased number of orderlies required to look after and attend to patients accommodated in separate cabins.

These considerations are more than sufficient to entirely condemn cabin accommodation for the sick and wounded. I should like, however, to add some further remarks with reference to the difficulties involved in disembarking helpless patients from cabins. It is a matter of great importance that it should be possible to place the stretcher, on which the patient is to be carried, either alongside his bed or at the head or foot of his bed, and this is impossible owing to the small size of the ordinary cabin; further, owing to the narrowness of the cabin door, and of the side passage between the cabins, it is impossible to carry a patient on a stretcher from his cabin to the main alleyway, running fore and aft, which is the nearest point to which the stretcher can be brought, and in many instances it is only with the greatest difficulty, as well as extreme discomfort and even danger to a helpless patient, that he can be carried thus far on a mattress or blanket. One has only to see a patient in an advanced and critical stage of enteric fever, or one with a fractured femur, taken out of an outside cabin to fully realise the difficulties and dangers involved in conveying him to a stretcher in the main alleyway. Cabin accommodation for the sick and wounded has already been abolished in the majority of transports, and the ships in which such hospital accommodation is still provided should not be used for trooping purposes until it has been abolished, and an open hospital on a cot-deck substituted.

Closely connected with this question is that of—

II. The Facilities for Embarking and Disembarking Helpless Patients.

Sufficient importance does not appear to be always attached to the facilities afforded for the embarkation and disembarkation of helpless patients. The difficulties involved in consequence of the accommodation of sick and wounded in cabins have already been pointed out, but there are other difficulties connected with the conveyance of stretcher cases from one deck to another, and between the ship and the shore.

The provision of a lift is the most suitable means for the conveyance of helpless patients from the hospital deck to the deck from which they are disembarked, and *vice versa*. It seems hardly necessary to point out that the lift should be sufficiently large to admit of the regulation pattern field ambulance stretcher, used for the disembarkation of invalids, being placed on it without difficulty, yet most of the lifts which I have seen on hospital ships and transports are too short to take this stretcher without a great deal of manipulation, involving delay and difficulty in placing the stretcher on the lift, and in taking it off after the lift has been hoisted up as high as it will go, for it cannot be hoisted up to the full extent in consequence of the poles of the stretcher projecting beyond the lift. All these difficulties and manipulations occasion a great deal of discomfort to the patient, and fill him with dread of an accident.

The lift should be provided with wooden side-pieces running along its entire length on each side to prevent the possibility of a patient falling over the edge of the lift while being raised or lowered. These side-pieces can be conveniently attached by means of patent hinges, and when raised should stand at least 12 or 14 in. above the surface of the lift. I have seen several lifts unprovided with these side-pieces, and there is considerable danger of a serious accident occurring in consequence. The guide-posts should be faced with metal on the surfaces on which the lift travels, and the ends of the lift which come in contact with the guide-posts should be provided with small rollers to prevent jamming while the lift is being raised or lowered. The wooden cross-bars in the floor of the lift should not be placed so far apart as to entirely admit the rollers of the stretcher between them, as in that case the patient comes to rest on the lift instead of being kept off it by the stretcher, but they should be placed at such a distance

as to partially admit the rollers, and thus prevent the stretcher moving forwards or backwards while the lift is being raised or lowered. Care should also be taken to see that the lift can be easily approached by a loaded stretcher on each deck, and that there is nothing to interfere with the stretcher being placed on or taken off the lift, *e.g.*, two very stout wooden uprights with a movable cross-bar have been erected on the upper deck of the transport "Plassy" to prevent men falling through the hatchway in which the lift is located. These uprights are placed only 5 ft. 6 in. apart, so that great difficulty is experienced in placing a stretcher (7 ft. 9 in. in length) on the lift or taking it off, and as a matter of fact the structure is entirely unnecessary, as the object for which it has been erected could be as easily attained by stretching a couple of chains between the iron stanchions opposite the lift, similar to those by which the rest of this hatchway is surrounded. Again, the upright guide-posts of the lift on the transport "Assaye" are not placed opposite the iron stanchions between which loaded stretchers have to be placed on or taken off the lift, and this operation is consequently rendered more difficult.

In ships in which lifts are not fitted for raising or lowering patients from one deck to another, a wide gangway with an easy gradient should be provided for the purpose in a suitable position easy of access to the hospital, and care should be taken that the gangway can be easily approached by a loaded stretcher both at its upper and lower end, and that there is no structure to interfere with the patient being kept as nearly as possible in a horizontal position while being carried up or down the gangway on a stretcher. In some transports the stretchers have to be carried up the saloon companion in order to avoid steep and narrow gangways and sharp turns in narrow passages; in others, even in the better class transports, great difficulty is experienced in passing loaded stretchers through some of the water-tight doors, which are only 24 in. wide. It is a matter for regret that these doors were not made wider when the ships were being built, as in other ships I have found water-tight doors 36 and even 42 in. wide.

Many different forms of apparatus have been invented for the conveyance of lying-down cases between the ship and the shore, but I have had no practical experience of any of them, and it would be outside the scope of this Report to discuss their relative merits, even were I in a position to do so. I shall merely

remark in passing that the method employed at Southampton is that of carrying the sick and wounded lying on ambulance stretchers or sitting in carrying chairs along a gangway, and it is found to answer satisfactorily on the whole. Extra long gangways, and occasionally other means, are required at high water to diminish the steepness of the descent to the wharf, and these long gangways are especially necessary in the case of ships unprovided with a port opening off the main deck through which invalids can be disembarked. The gangways should be extra wide so as to facilitate the passage of the bearers with their stretcher.

Some of the difficulties referred to in connection with the disembarkation of helpless patients might be avoided by providing a number of stout canvas sheets, sufficient to allow of one being appropriated to the use of each patient to be carried ashore. Each sheet should be 6 ft. 6 in. long by 2 ft. wide, and should be provided with a canvas sheath along each side, through which a pole can be introduced for the purpose of converting the sheet into a stretcher; iron cross-bars with a ring at each end, which can be slipped over the handles of the stretcher, should be provided with a view to keeping the stretcher poles apart—these cross-bars can, if necessary, be dispensed with in passing through narrow doorways. The canvas sheet can be placed under the patient as he lies in his bed on the cot-deck in the manner usually adopted by hospital nurses in changing the under-sheet, the poles can then be introduced into their sheaths, and the cross-bars adjusted or not according to the requirements of the case. A mattress having been placed on the lift, the patient can be laid on it with the canvas sheet still beneath him, and the poles withdrawn. These can be re-introduced as soon as the patient is hoisted on the lift to the upper deck, and he can be carried ashore in the manner described and into the ambulance train, where he can be laid on a mattress on one of the cots, the poles being again withdrawn. On the arrival of the train at the Royal Victoria Hospital, Netley, he can be similarly carried out of the train and placed on a bed in the ward to which he has been allotted, and the canvas sheet can then be withdrawn from beneath him. By adopting this plan the patient can be transferred from his cot on board ship to his bed in hospital with the greatest amount of comfort, and the least possible amount of disturbance in consequence of having to be shifted several times between cots and stretchers.

III. The Position of the Cot-deck Hospital.

The necessity for the abolition of cabin hospital accommodation, and the provision of an open hospital on a cot-deck having been established, the position of the hospital is the next question to be considered.

The Admiralty Transport Regulations lay down that "a sufficient space will be appropriated in the most suitable part of the vessel for the hospital," and that it "must be built in the lightest and most airy place." Notwithstanding these instructions I have found the hospital in some cases situated over the screw, and in others right up in the bow of the ship, while in a vessel I inspected not long ago, the hospital communicated with the lower troop deck by means of a large open hatchway, through which much foul air and noise reached the hospital (this defect has since been remedied). The hospital should be placed on the upper or main deck, and as nearly amidships as possible with a view to diminishing the discomfort arising to the patients from the motion of the ship and the vibration of the screw; it should also be placed as remote as possible from hatchways through which cargo and heavy baggage are lowered into and taken out of the hold. I have seen such a hatchway running through the hospital deck. In some transports the hospital is placed on one side of a portion of the main deck, while in others it extends across the entire width of that deck; the latter is much the best arrangement, as it increases the facilities for ventilating and lighting the hospital, and makes it more compact. In the P. and O. transports "Plassy" and "Assaye," a portion of the hospital (ten cots) is located on the after part of the upper deck above the main hospital, which is a convenient arrangement for the accommodation of special cases. It is also found very convenient to partition off three or four single-tier cots on the main hospital deck to form a separate ward for special cases. This ward should be provided with a wide doorway through which a loaded stretcher can be easily carried into or out of the ward, and should be fitted with a washstand (with water laid on), and also with a portable electric fan. It seems hardly necessary to point out that the hospital deck should be solid, the wooden deck being properly laid on the iron deck, the two being bolted together so as to leave no intervening space.

IV. The Cots and their Arrangement.

In the regulations for H.M.'s Transport Service, the following instructions are laid down: "Standing bed-places, three to every 100 men fitted for, to be built up in one or two tiers as directed, well clear of the deck and side, 6 ft. long, and 2 ft. 3 in. wide in the clear, with iron lattice bottoms, 4-inch mesh." The number of hospital cots authorised, viz., 3 per cent. of the troops embarked, appears to be sufficient under ordinary circumstances.

The cots at present supplied to transports for hospital purposes are of two kinds—(1) the swinging cot, and (2) the fixed cot. The swinging cot, which is the pattern provided in the better class transports, is composed of an iron framework, with canvas sides and an iron lattice bottom; it is 6 ft. 3 in. long by 2 ft. 1 in. wide. These cots are slung on iron supports securely fastened to the deck at the head and foot of each cot, and are interchangeable as regards their position, so that a patient can be moved from one part of the hospital deck to another, or to the upper deck, without having to be taken out of his cot; by a simple mechanism these cots can be fixed so as to prevent them swinging. Each cot is fitted with two small tables about 8 in. in width, one running across the head of the cot, and the other capable of being adjusted across the middle of the cot or along its side, according to the requirements of the patient. Suspended above each cot is a rope with a wooden handle, by means of which the patient can raise himself in bed.

These cots are on the whole satisfactory, but I would suggest the following improvements:—

(1) Wire-woven mattresses might with advantage be substituted for the iron lattice bottoms, which are very hard and unyielding.

(2) Wooden side-pieces fitting in vertical slots in the iron framework, and capable of being removed, or adjustable iron railings would be preferable to the canvas side-pieces, as the men sit on the latter when getting into and out of bed, and when dressing, and very soon flatten them out, so that they are of no use for the purpose for which they are intended.

(3) A receptacle for holding an ordinary glass tumbler should be fitted to the cot table, and a small wire basket made to hang alongside the cot would be found very useful.

These cots are always arranged in a single tier on board transports, and are separated from each other so that they can be freely approached from either side and from one end; they are usually placed end to end in pairs.

It would be a great advantage if the cots were provided with folding iron legs, or if a few pairs of the iron supports on which the cots are slung were fixed in convenient places on the upper deck, as patients who are not able to get up could then be moved in their cots by means of the lift to the upper deck for an hour or so when the weather is suitable, as it usually is in the Tropics. The fresh air and change would be of the greatest benefit to the patients, who could be comfortably moved in the manner described.

The fixed cots are constructed with either an iron or wooden framework, with wooden sides and iron lattice bottoms, and are arranged either singly or in pairs or groups, in single or double tiers, the pairs being placed end to end or alongside each other without any intervening space, an arrangement still existing on some of the hospital ships. Comparatively few of these fixed cots are provided with the small cot tables fitted to the swinging cots. They should be similarly supplied when arranged in single tier, but one small table at the head of the cot and a small wire basket hung alongside would be sufficient when they are arranged in double tiers. Wire-woven mattresses should be substituted for the iron lattice bottoms.

On board the hospital ship "Victor Emanuel," which was fitted out about thirty years ago, a few cots of extra size (7 ft. by 2 ft. 6 in.) were supplied, and similar provision might with advantage be made in our modern transports.

A diet board, on which the patient's extra diet sheet can be fixed, should be supplied for each cot, and should be fitted with hooks by means of which it can be hung at the foot of the cot.

In discussing the question whether cots should be arranged in single or double tiers, several important matters have to be taken into consideration. From a professional point of view double-tier cots are inadmissible for serious medical or surgical cases for the following reasons, some of which have already been brought to notice in condemning cabin hospital accommodation :—

(1) The extreme difficulty involved in moving helpless patients into or out of such cots, when being embarked or disembarked.

(2) The danger of patients in the lower cots receiving the dejecta of helpless cases of enteric fever or dysentery in the upper cots.

(3) The unpleasant results to the occupants of the lower cots when patients in the upper cots are seized with sea-sickness.

(4) The great difficulty experienced by debilitated patients who may be allowed up for a couple of hours daily, in getting into or out of the upper cots for purposes of nature, &c., especially when there is a heavy sea running.

(5) The difficulty experienced by the medical officer in "getting at" a patient in either an upper or lower cot for purposes of examination or treatment.

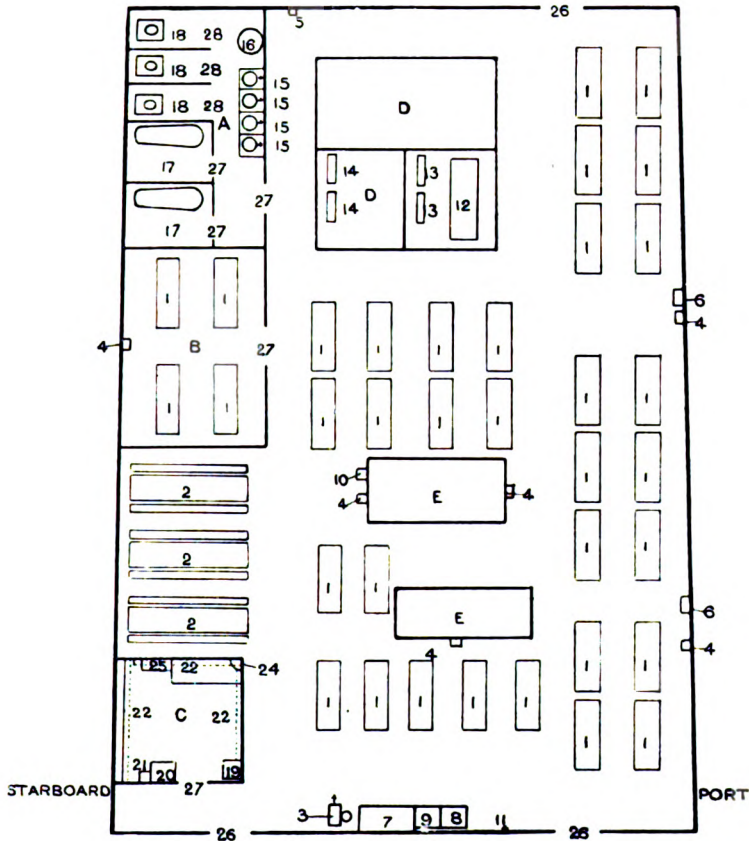
(6) The loss (half) of cubic space to each patient where double tier cots are provided.

On the other hand, from the transport officer's point of view, there is the loss in cabin and troop accommodation involved by the increased amount of deck space required for a single tier of hospital cots. In June, 1901, the War Office advocated the abolition of the old hospital berths, in which two patients lay alongside one another, and the provision of a certain proportion (1 per cent.) of one-tier cots for serious cases. The increased efficiency of the hospital accommodation brought about by the adoption of these reforms should be found to amply compensate for the loss in the troop-carrying capacity of the transports.

For the reasons already given I do not think any patients, except mild cases and convalescents who are able to be up and about for the greater part of the day, should be accommodated in double-tier cots, and consequently the proportion of one single-tier cot to two cots arranged in double tier appears to me to be too small. As a matter of fact, in the large majority of transports provided with an hospital cot-deck, all the cots are arranged in single tier. In the transport "*Dilwara*" about 50 per cent. of the hospital cots are so arranged, and they are of the swinging pattern; further, the portion of the deck occupied by the single-tier cots is separated by a bulkhead (with communicating doors) from the part allotted to double-tier cots. This is a satisfactory arrangement, but I think not less than 60 per cent. of the cots should be in single tier, and in those ships in which all the one-tier cots are of the fixed variety, I would suggest half of them being replaced by swinging cots.

As regards the amount of deck space that should be allowed to each hospital cot, I find that in the P. and O. transports "*Plassy*" and "*Assaye*," in which all the cots are arranged in

FIG. 1.—PLAN OF HOSPITAL ON BOARD TRANSPORT "SICILIAS."
($\frac{1}{4}$ th inch to 1 foot.)



Drawn by G. B. Stanistreet, Capt. R.A.M.C.

- | | | |
|--|---|---|
| A. Lavatory enclosure. | 7. Life-belt rack. | 17. Bath rooms with re- |
| B. Separate ward. | 8. Cupboard for patients' medicines. | 18. Water-closets. |
| C. Dispensary. | 9. Cupboard for medical comforts. | 19. Washstand with receptacle beneath. |
| D. Hatchway and companion-way. | 10. Steam kettle. | 20. Writing desk. |
| E. Not included in hospital. | 11. Drinking-water tap and receptacle. | 21. Stationery rack. |
| 1. Swinging cots in single tier with cot-tables. | 12. Lift. | 22. Shelves for bottles. |
| 2. Mess-tables with seats on each side. | 13. Foot of companion ladder from upper deck. | 23. Compounding table with cupboards and drawers beneath. |
| 3. Large electric fan connected with air-trunk. | 14. Head of companion ladder to lower deck. | 24. Filter. |
| 5. Fire-hydrant. | 15. Wash-hand basins with troughs beneath. | 25. Poison cupboard. |
| 6. Washstand "for medical use only." | 16. Soiled linen tub. | 26. Water-tight doors. |
| | | 27. Ordinary doors. |
| | | 28. Screens instead of doors. |

single tier, the average superficial area allowed to each cot is 63·27 square feet, after deducting the space devoted to the hatchways, companion-ways, dispensary, lavatories, bath-rooms, w.c.'s, dining tables and cupboards, while in the P. and O. transport "Sicilia" it is 77·49 square feet. Owing to the construction of the ships, the cots cannot be evenly distributed over the available deck-space, and are usually arranged in groups of two or three, placed end to end, with from 2 ft. 6 in. to 3 ft. between the sides of neighbouring cots. With efficient ventilation and a height between decks of from 8 ft. to 8 ft. 6 in., the space allowed to each hospital cot on the "Plassy" and "Assaye" may, I think, be regarded as amply sufficient. It is interesting to note that on the main deck of the hospital ship "Victor Emanuel," 36·90 square feet were allowed to each cot, and in the Japanese hospital ship which accompanied the fleet in the war against China, each man was allowed 31·50 square feet of deck space.

On homeward voyages additional accommodation is often provided for convalescent cases by appropriating a troop-deck, and slinging ordinary naval canvas cots from the hammock hooks.

V. Cupboards for Patients' Medicines and Medical Comforts.

Two suitable cupboards are required on the cot-deck, one for the patients' medicines and surgical dressings in daily use, and the other for the medical comforts, including stimulants, ordered for the patients. These cupboards should be provided with good locks, and with shelves fitted to hold bottles securely. The medicine bottles supplied in the regulation pattern medicine chest for dispensing purposes are flat, so that bottle-racks pierced with round holes are not altogether suitable. A drawer for surgical dressings should be fitted in the medicine cupboard, and care should be taken that there is sufficient room between the bottom of the medical comfort cupboard and the first shelf to admit of the easy introduction or withdrawal of an ordinary spirit or wine bottle. A cupboard 3½ or 4 ft. in height, by 2 ft. broad, and 1 ft. in depth, should meet ordinary requirements. Where the hospital consists of more than one ward cupboards of suitable size should be placed in each ward.

VI. Ice-chests.

Ice-chests are provided in the wards of hospital ships and are found to be a great convenience in the Tropics; one might be supplied for the hospital of each permanent transport.

VII. Mess-table Accommodation.

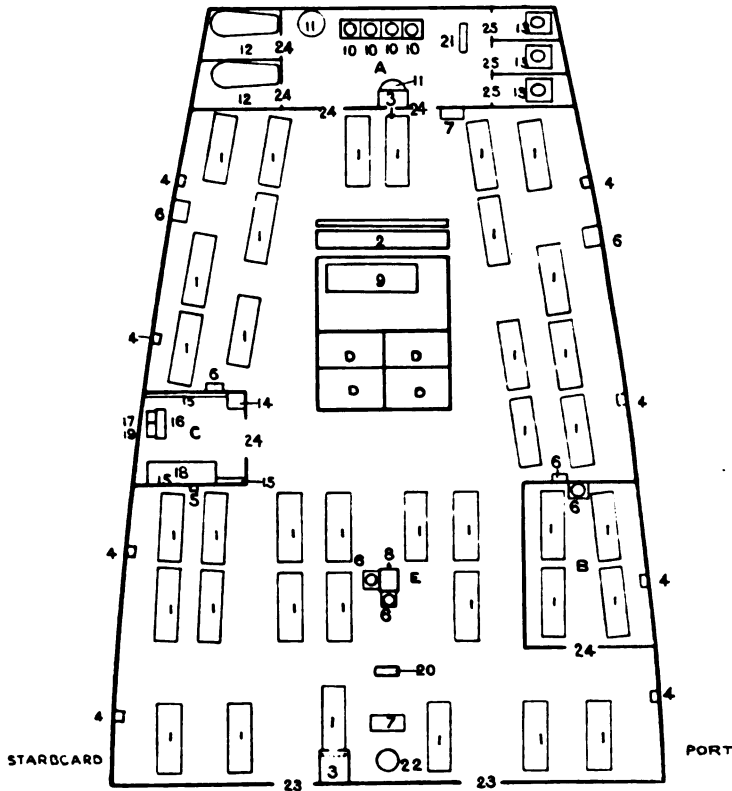
As a rule the hospital dining-table accommodation provided on transports is very deficient, and it is interesting to note in this connection that when the hospital ship "Victor Emanuel" left this country to bring home invalids from the Ashanti war nearly thirty years ago, no tables of any description had been provided on the hospital deck; some were, however, soon fitted up for meals, games, &c. This deficiency in mess-table accommodation is found even in some of the best transports; *e.g.*, in the hospital on board the "Plassy" and "Assaye," each of which ships is fitted with forty-seven cots, there is room for only sixteen patients at the mess-table, and there is no mess-table on the upper hospital deck, where ten cots are located. The other extreme is met with in the hospital of the "Dilwara," which has dining-table accommodation for eighty patients, though there are only sixty-seven cots; and in the "Sicilia," which can accommodate forty-two patients at the hospital mess-tables, though she is only fitted with thirty-five cots. The Admiralty Transport Regulations direct in Appendix I. that "proper arrangements" be made "for the patients to mess," while it is laid down in the specifications for fitting hospitals on transports that "one or more of the nearest mess-tables will be told off for the hospital." It appears to me very undesirable that hospital patients should take their meals on the troop-deck, and this is not often done, but in order to avoid it sufficient mess-tables should be provided in the hospital for 60 per cent. of the sick, *i.e.*, for all the patients accommodated in double-tier cots, and one third of the more serious cases allotted to single tier cots. I do not think this can be regarded as too large an estimate of the number of patients who will be able to get out of bed for their meals during a part or the whole of the voyage.

In ships in which sufficient space is not available in the hospital for mess-tables, the nearest mess-tables on the troop-deck adjoining the hospital should be partly partitioned off for the patients.

VIII. Messing Accommodation for the Detachment of the R.A.M.C.

A separate small mess-table on the troop-deck nearest the hospital is, as a rule, partly partitioned off for the detachment of the R.A.M.C. A small lock-up cupboard is provided in some ships; it would be an advantage if this were always supplied.

FIG. 2.—PLAN OF HOSPITAL ON MAIN DECK OF TRANSPORT "ASSAYE."

 $\left(\frac{1}{8}\right)$ th inch to 1 foot.

Drawn by G. B. Stanistreet, Capt. R.A.C.M.

- | | | |
|---|---|---|
| A. Lavatory enclosure. | 7. Cupboards for medicines and medical comforts. | 16. Poison cupboard. |
| B. Separate ward. | 8. Drinking-water tap and receptacle. | 17. Stationery rack. |
| C. Dispensary. | 9. Lift. | 18. Compounding table with cupboards and drawers beneath. |
| D. Hatchways and companion ways. | 10. Wash-hand basins with troughs beneath. | 19. Filter. |
| E. Not included in hospital. | 11. Soiled linen tubs, one of them partly beneath electric fan stand. | 20. Emergency ladder to upper deck. |
| 1. Swinging cots in single tier with cot-tables. | 12. Bath-rooms with reclining baths. | 21. Foot of companion ladder to upper deck. |
| 2. Mess-table with seat alongside. | 13. Water-closets. | 22. Mast. |
| 3. Large electric fan connected with air-trunk and opening above cot. | 14. Washstand with receptacle beneath. | 23. Water-tight doors. |
| 4. Portable electric fans. | 15. Shelves for bottles. | 24. Ordinary doors. |
| 5. Fire-hydrant. | | 25. Screens instead of doors. |
| 6. Washstand "for medical use only." | | |

IX. Pantries.

Pantries are usually provided in hospital ships for the washing up and storage of the mess utensils, and are very useful; they are fitted with plate-racks, cupboards, shelves, &c., and should have a sink with hot and cold water laid on. In the absence of a pantry a suitable sideboard should be provided, properly fitted with drawers, cupboards, plate-racks, glass-racks, &c. The sideboards supplied to the hospital ship "Nubia" are of a suitable pattern, and satisfactory.

X. Electric Kettles and Saucepans.

Kettles in which water can be heated by means of electricity or steam—preferably the former—are most useful; one should be fitted on a stand in each ward and provided with a tap through which the hot water can be drawn off.

Electric saucepans are also very useful for preparing soup, beef-tea, &c., for the patients at night, and at other times when the cook's galley cannot be conveniently made use of. One should be supplied in each hospital.

XI. Supply of Drinking Water.

An ample supply of pure drinking water should be laid on to each ward, a drinking-cup being fitted alongside the tap, and a receptacle placed beneath to catch the overflow.

The majority of filters which I have seen on board transports are of the old charcoal or manganous carbon pattern; they should be abolished and Pasteur-Chamberland or Berkefeld filters substituted.

XII. Appliances for Heating and Lighting the Hospital.

Electric or steam radiators, preferably the former, or hot-water pipes, should be distributed through the hospital for heating purposes; they are particularly necessary on homeward voyages from the Tropics during the winter.

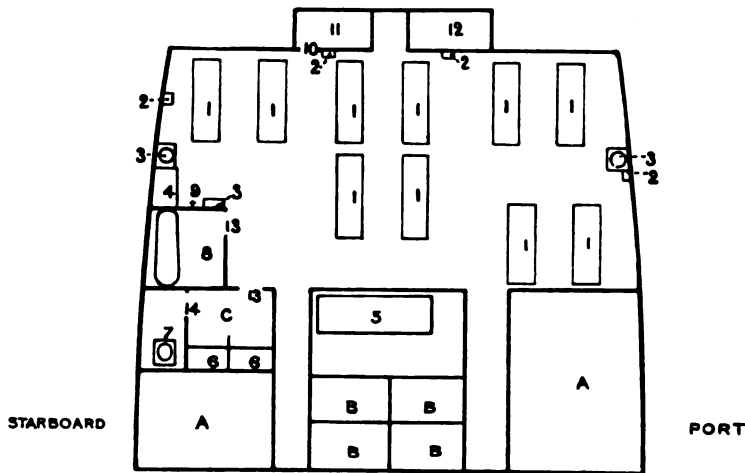
The hospital should be well lighted by means of ports, skylights, windows, &c., and should be well supplied with electric light.

XIII. Lavatories, Bath-rooms, W.C.'s.

No provision appears to be made for hospital lavatories, bath-rooms, or w.c.'s in the Admiralty Transport Regulations.

The most convenient arrangement is to have them grouped together in an enclosure, either in a corner of the hospital close to a hatchway, or else immediately outside the hospital on the same deck. Two such lavatories are fitted in the transport "Dilwara"; the after one, which is placed immediately outside the hospital, and extends across the entire width of the deck, is the better arranged of the two, as it ensures thorough cross ventilation

FIG. 3.—PLAN OF HOSPITAL ON UPPER DECK OF TRANSPORT "ASSAYE."
($\frac{1}{8}$ th inch to 1 foot.)



- | | | |
|--|---|--|
| A. Not included in hospital. | 4. Cupboard for medical comforts. | 10. Door of cupboard under companion ladder. |
| B. Hatchways and companion ways. | 5. Lift. | 11. Companion ladder to poop. |
| C. Special lavatory enclosure. | 6. Special washing troughs (metal-lined). | 12. Companion ladder to hospital on main deck. |
| 1. Swinging cots in single tier with cot tables. | 7. Water-closet. | 13. Doors. |
| 2. Portable electric fans. | 8. Bath-room with reclining bath. | 14. Screen instead of door. |
| 3. Washstand "for medical use only." | 9. Drinking-water tap and receptacle. | |

and can be completely shut off from the hospital; a similarly arranged lavatory is to be found on the transports "Plassy" and "Assaye."

The basins are of enamelled iron, fitted in a wooden framework, and made to tip up so that the contents can be emptied into a trough, which lies beneath; cold fresh water is laid on, a tap being supplied over each basin. Hot fresh water should also be laid on, or a tap should be placed in a convenient position

in the lavatory for the supply of hot water for ablutionary purposes. The metal-lined trough beneath each basin is intended to serve for the washing of hospital linen, and can be made use of by raising the wooden frame in which the basin rests; it would be preferable to have separate troughs provided for the purpose, as in the P. and O. transports "Plassy" and "Assaye." In some ships I have seen the basins fitted in a framework over the bath, into which they are emptied; this is not a satisfactory arrangement. A looking-glass should be supplied in the lavatory.

The w.c.'s are of the ordinary ship's pattern provided for first-class passengers, and are supplied with a good flush of water; they are placed against the vessel's side and are satisfactory, but a door should be substituted for the canvas screen hung in the doorway of each w.c., to enable it to be completely shut off from the lavatory enclosure and hospital. The seat should be made to lift up, so that the closet can be used as a urinal, and the floor should be impermeable. Trough w.c.'s are not suitable for hospital use and are rarely provided for the purpose. Objections have been raised to having the w.c.'s in such close proximity to the hospital, but if they are of a good pattern, placed against the ship's side, with air-tight bulkheads and closely fitting doors, and properly ventilated by means of port-holes and up-cast air-trunks, I do not think they are ever likely to be offensive, while the great advantage of having them close to the hospital is that they can be used by a larger number of patients than if they were placed at a distance, or on the deck above, and the desirability of every patient, except those entirely confined to bed, using the w.c. instead of a Fyffe's chair in the hospital is obvious. In one ship which I inspected not long ago I found the w.c.'s situated on the deck above the hospital, and approached by an extremely steep gangway, so that they could not be reached except by patients well advanced in convalescence, and then only in the event of the sea being comparatively smooth.

The hospital baths are of the usual full-sized reclining pattern, and have both fresh and salt water laid on, as well as steam for heating purposes. The fresh water taps are provided with padlocks to prevent waste. Similar baths are fitted in the P. and O transports, and are satisfactory, but a considerable number of hospital baths in other transports have only cold salt water laid on, which is of little use for hospital purposes, while in some of

those provided with fresh water taps no fresh water is obtainable. A large number are without steam for heating purposes—I have found this to be the case even in hospital ships. With the facilities provided in modern steam-ships for distilling and storing water there should be no difficulty in providing a sufficient supply of fresh water for the hospital baths, and consequently these should have fresh water laid on as well as salt, and should be supplied with steam for heating purposes, unless hot fresh water be laid on. The necessity for having hospital baths supplied with fresh water as well as salt, and with steam for heating purposes, was recognised in fitting out the hospital ship “Victor Emanuel” nearly thirty years ago. The salt water taps often leak owing to the action of the salt water.

The greatest differences exist as regards the scale of baths, wash-hand basins, and w.c.’s supplied for hospital purposes. The number of baths varies from one for forty cots to one for fifteen to sixteen cots, while the scale of basins provided in the lavatory has been found to vary from one for every twenty cots to one for five to six cots, and the number of w.c.’s from one for every forty patients to one for every seven or eight patients. The following scale should be found to meet all requirements :—

One bath for every fifteen to twenty cots.

One basin for every eight to ten cots.

One w.c. for every ten to twelve cots.

A varying number (3 to 19 per cent.) of washstands, most of them with cold water laid on, are to be found distributed round the hospital with a notice “for medical use only” painted above them; these are presumably intended for the convenience of the sisters or orderlies engaged in washing patients who are confined to bed. A suitable number of enamelled iron basins (say one for every ten cots), to be kept in a convenient place in the hospital lavatory, would answer the purpose equally well.

XIV. Wash-places for Use of the Medical Staff of the Ship.

Some of the washstands referred to above are generally made use of by the medical staff of the ship. Two washstands placed in a convenient position on the cot-deck would suffice for the purpose—one for the medical officers and sisters (if any), and the other for the orderlies. The ordinary shut-up cabin washstand is sometimes supplied, or an enamelled iron basin set in a wooden

frame and provided with taps placed above it, through which a good supply of fresh water (hot and cold) is obtainable, would answer the purpose satisfactorily.

XV. Means for Disinfecting and Washing Hospital Clothing.

Two large soiled linen tubs, either of galvanised iron or wood, preferably the former, are required for disinfecting hospital clothing, and are supplied in the better class of transports, where they are fixed in the lavatory enclosure, in which a couple of troughs for washing the disinfected clothing should also be provided, with fresh water (hot and cold) laid on. These troughs would be available for washing ordinary hospital clothing when necessary. Such troughs, but with only cold water laid on, are provided in the lavatory enclosure on the upper deck of the "Plassy" and "Assaye," and are to be found in many transports beneath the basins; the latter cannot be considered an altogether satisfactory arrangement. I think it would be a good plan to have the soiled linen tubs and washing troughs placed in the soiled linen room to be referred to later on, where arrangements might be made for drying the hospital clothes after washing.

The R.I.M. transport "Hardinge" is provided with a steam and hot-air disinfecting chamber, and it would be an advantage to have similar chambers fitted in all ships permanently engaged in transport work.

A galvanised iron sanitary bin fitted with a lid is provided in the after lavatory of the "Dilwara," and on the upper hospital deck of the "Plassy" outside the bath-room, but the necessity for such is not much felt.

XVI. Dispensary and Office.

More than half of the specification laid down in the Admiralty Transport Regulations for fitting hospitals on board transports is devoted to a description of the dispensary, and a two-page plate of drawers and a stand for bottles is added, this being the only plan given of any of the hospital fittings. The specification in question makes provision for a dispensary 6 ft. square, with a door $3\frac{1}{2}$ ft. wide fitted with a lock, and directs the supply of two drawers, 3 ft. long, to be surmounted by three shelves to hold eighteen bottles, varying in diameter from three to six inches.

Provision is further made for an additional shelf 6 ft. in length (also for bottles), and for a suitable washstand and basin, water-can and receiver, also a camp-stool, a swinging candle-lamp, and a filter of approved description. Such a dispensary would fall very short of modern requirements, and the specification is no longer adhered to in fitting out the better class of transports; still it is adhered to in some instances, and it consequently stands in need of revision.

The following are some of the defects I have observed in inspecting the dispensaries on board transports—deficiency in size, there being no room for the regulation pattern medicine chest, and the door being often too narrow to admit it; deficiency in the number of cupboards and drawers provided for medicines and surgical materials, the absence of a water supply and sink, and the unsatisfactory pattern of filter supplied

There are two dispensaries on board the “Plassy” and “Assaye”; this is unnecessary, as one dispensary is quite sufficient, and that on the hospital deck with a few improvements should be found to fulfil all requirements. This dispensary occupies a space 10 ft. by 8 ft., is sufficiently large and is very well fitted with cupboards and drawers and shelves for bottles. There is an excellent compounding table 6 ft. long by 2 ft. wide, at the back of which are placed shelves fitted for the reception of forty bottles of various sizes; beneath the table are two cupboards (32 in. high by 23 in. wide), one on either side, each being fitted with two shelves, and between the cupboards are three large drawers (22 in. wide) placed one above the other. There is an additional cupboard at the opposite side of the dispensary, measuring 31 in. in height by 30 in. in width, and fitted with three shelves for bottles. This cupboard is provided with a lock and might be set apart for poisonous drugs, &c. The dispensary is further supplied with a steam hot-water kettle, stationery rack, wash-place, and filter; it is ventilated by means of a port-hole and a special up-cast air-trunk, and is well lighted by electricity.

The iron upright which is placed just inside the door and which prevents the admission of the medicine chest, should be removed, and a suitable place should be allotted to the medicine chest. A sink is required, and water should be laid on with a tap above the sink to facilitate the washing of bottles, &c. A Pasteur-

Chamberland or Berkefeld filter should be substituted for the manganous carbon filter at present supplied. An electric steriliser should be provided, and an electric kettle would be preferable to a steam kettle. With the improvements indicated above this dispensary might be taken as a type of dispensary suitable for permanent transports, and it is with this object in view that I have entered into so much detail. An arrangement which I saw on the transport "Victorian" struck me as a good one. In that ship the dispensary door is divided, so that the upper half can be opened independently of the lower half; by opening the former and keeping the latter closed medicines can be conveniently issued to men attending hospital, and they are prevented from entering the dispensary.

The other dispensary on board the "Assaye" and "Plassy," which is located in a deck-house on the upper deck, and which is used both as an office and a dispensary, might be entirely converted into an office, where the medical officer in charge could see and examine men reporting sick, and where the office work of the hospital could be conducted. The want of an office is greatly felt on those transports which are unprovided with such. It should be properly fitted with a couple of office tables, lock-up drawers, stationery-rack, shelves, &c. If it should be found impracticable to provide an office in the majority of transports, the dispensary should be slightly enlarged to enable the office work to be conducted in it, and should be fitted with a suitable office table with lock-up drawers.

XVII. Hospital Store-rooms.

Store-rooms for hospital clothing, hospital stores and equipment, soiled linen, and invalids' effects are provided close to the hospital, usually on the deck below in the better class of transports, and are very necessary. They should be about 10 ft. by 8 ft. in size, and should be provided with wide doors and fitted with racks and shelves. I have already made some remarks about the soiled linen room in discussing the means for disinfecting and washing hospital clothing; this room is usually lined with zinc or tin, which is a good arrangement. Great inconvenience is experienced in transports unprovided with these hospital store-rooms. The purpose for which each store-room is set apart should be indicated on the door to prevent misappropriation, and each room should be well supplied with electric light.

XVIII. Ventilation.

The regulations for H.M.'s Transport Service direct each deck to be separately ventilated, the decks being cut for air-trunks and funnels wherever necessary; it is further laid down that large movable cowls are to be fitted to all funnels, and that to ensure proper ventilation the funnels are to be arranged in pairs, one being brought down to within a foot of the deck, and the other cut off close to the deck above, thus furnishing an uptake and down-draught, the air-trunks being made to act in a similar manner. Provision is also made for the fitting of iron air scoops to the scuttles so that they can be easily shipped and unshipped, and it is laid down that any other system of ventilation that may be ordered will be outside the contract and must be specially arranged for. A description is given in one of the Appendices of Edmond's "System of Ventilation," in which foul air is extracted by means of steam jets creating a vacuum in the upper ends of outlet or up-cast air-trunks, which are connected with a system of perforated air-shafts running fore and aft between decks. This system can, it is stated, be used either to exhaust foul air or diffuse cool air, the latter object being attained by shutting off the steam jets and turning the cowl to the wind.

I do not propose to discuss the question of ventilation on ship-board in detail, as it is fully dealt with in Notter and Firth's "Hygiene," while Fleet-Surgeon Kirker, R.N., and Lieut.-Colonel A. M. Davies, R.A.M.C., have recently investigated the system of ventilation of transports, and have written a full report on the subject. These authorities advocate the propulsion system of ventilation, in which an abundant supply of absolutely pure air is introduced between decks by means of electric fans fitted in the lower ends of inlet or down-cast air-trunks, and, except for w.c.'s and places where hot and foul air is generated, they condemn Edmond's system of ventilation by exhaustion, as, even if the foul air be effectively removed, there is no control over the source of the air coming in to replace that which is being withdrawn. They point out that this system should never be used for the supply of air owing to the accumulation of dirt in the air-trunks caused by the frequent passage through them of foul air in the process of extraction. The expediency of placing the propulsion fans at the ends of compartments most remote from the hatchways, and of arrangements being made for the fresh air to be delivered horizon-

tally against the bulkhead instead of towards the hatchway, is pointed out; by adopting this method the air is better distributed, draughts are diminished, and patients in the neighbouring cots do not have the air impinging directly on them. Outlet shafts should be provided at as present, and all unnecessary bends in air-trunks avoided.

The conclusions finally arrived at in Kirker and Davies' report are that the usual means adopted for natural ventilation, viz., port-holes with airscoops, hatchways with or without wind-sails, skylights, and air-trunks fitted with cowls, are sufficient on the upper deck, while on the main deck these means should be supplemented by electric propulsion fans, the latter being depended on for the ventilation of the lower deck, and that Edmond's exhaustion system when fitted on this deck should be worked continuously instead of only occasionally, and should be used in conjunction with the propulsion fans supplying fresh air. McWhirter's portable electric fans unconnected with air-trunks are not of course true ventilators, but they help to circulate the air in the hospital and are very cooling and refreshing. They should be supplied in all transports in the proportion of one to about every five cots.

The chief defects which I have found in the ventilation of the hospitals on board transports are (1) the absence in some cases of electric propulsion fans fitted in inlet air-trunks; (2) when provided, they are not always located to the best advantage, and in many instances deliver the fresh air towards the ward, so that it impinges directly on the neighbouring cots; (3) the electric fans, if worked continuously in the Tropics, are apt to get out of order through charring of the insulating material surrounding the wire, and from other causes; (4) the Edmond's extraction system, when fitted, is in some instances used for the supply of fresh (?) air—I have seen instructions to this effect fixed to air-trunks on a hospital ship; (5) the hospital has in some cases been found to communicate with troop-decks by means of hatchways, ventilating shafts, and apertures in bulkheads; (6) the absence of portable electric fans.

XIX. Means for Isolating Cases of Infectious Disease.

No provision is made in the regulations for H.M.'s Transport Service for the accommodation of cases of infectious disease, though the importance of being able to isolate such cases on board ship

effectively and without delay can hardly be over-estimated, as the speedy detection and prompt isolation of the first case or two may prevent a dangerous epidemic from spreading through the ship. I find it stated in a description of the hospital ship "Victor Emanuel" that arrangements could be made for walling in and roofing with canvas the portion of the poop behind the mizen-mast for the reception of cases of infectious disease, and notwithstanding the great advances made in sanitary arrangements during the last thirty years, little progress appears to have been made in the matter of providing accommodation for infectious cases on board ship, and the arrangements for isolating such cases have usually to be improvised.

The "Maine" is the only hospital ship I have seen provided with a "zymotic ward," though I have found an upper-deck cabin set apart on one or two transports for the accommodation of cases of infectious disease. Now, I think there is no doubt that means for the isolation of such cases are more necessary on board transports than in hospital ships, for cases of infectious disease are more likely to appear amongst troops who have been free to go about garrison towns prior to embarkation, than amongst men who have been in hospital for some considerable time, and who are transferred thence to the hospital ships in which they are conveyed home.

Under all the circumstances of the case, and even at the sacrifice of the necessary amount of space, I think suitable accommodation should be provided on the upper part of the upper deck for isolating cases of infectious disease. A well-ventilated wooden deck-house sufficiently large to contain three or four cots in single tier, and fitted with all the necessary appliances, including a small attached lavatory, containing a couple of wash-hand basins, bath-room and w.c., should answer the purpose, the principles already advocated in the foregoing pages being followed in arranging and fitting the accommodation. If in any particular transport it should be found impracticable to reserve special accommodation for the isolation of cases of infectious disease, definite arrangements should be made beforehand to give up or improvise suitable accommodation for the reception of such cases in the event of their appearing.

XX. Accommodation for Sick Women and Children.

The Regulations for H.M.'s Transport Service direct that a hospital is to be provided for women when ten or upwards are

carried, one berth being allowed for every twenty adults after the first ten. The hospital is to be "built and fitted as specified for families of N.C.O.'s, Class 16, size as for officers' cabins," an additional hospital being built when more than six berths are required. In Class 16 accommodation, the necessary space is bulkheaded off, the berths being arranged in two tiers with a seat running along the lower berths. Provision is made for washstands and, when more than four are fitted for, a bath with salt water supply, and washing trough with fresh water supply. A separate, specially well-ventilated w.c. is to be provided for the hospital, the door when practicable communicating with it.

On board the transports "Plassy" and "Assaye," a women's hospital is provided in a suitable position, with four cots in single tier, a properly fitted washstand, and adjoining bath-room and w.c. Two portable electric fans are also provided, and a camp-stool is authorised for each berth.

In the ships permanently engaged in the transport service, a women's hospital should be provided with the necessary number of cots in single tier, and it should be fitted and arranged on the lines laid down in the foregoing pages for the provision of hospital accommodation for men. The washstand might be conveniently placed in the bath-room, the latter intervening between the hospital and the w.c.

XXI. Accommodation for Sick Officers.

No hospital accommodation is provided on board transports for sick officers, in consequence of which they have to be treated in their cabins, an arrangement open to very serious objections, as already brought to notice in dealing with the question of hospital accommodation for men. There is no doubt that a certain proportion of sick and invalided officers can be more or less satisfactorily treated in cabins, and preferably in cabins set apart for the purpose, but special arrangements are essential for dealing with serious medical and surgical cases amongst officers. This principle has been to some extent recognised in hospital ships by the provision of an officers' ward equipped with six single-tier cots, and I think a similar arrangement might reasonably be extended to transports, in which a few (say four) single-tier cots should be partitioned off for the accommodation of serious cases amongst officers. This officers' ward should be equipped and arranged in

a similar manner to the men's hospital; it should be provided with a small pantry, and should have a lavatory attached with basins, bath-room, w.c., &c.

XXII. Accommodation for Lunatics.

In those ships in which accommodation for lunatics is provided, it consists of about eight single padded cells situated alongside the prisoners' cells. In some of the transports in question it was noticeable that the padding had become so hard from repeated painting that it was of comparatively little use for the purpose for which it was intended. Willesden waterproof canvas might with advantage be substituted for the painted canvas generally used. Comparatively few of the lunatics, however, require to be confined in padded cells, and such accommodation is not likely to improve the mental condition of the patients, the majority of whom might be more suitably accommodated in a special lunatic ward under proper supervision. A portion of the upper deck is usually set apart for the lunatics to enable them to get exercise and fresh air, and is surrounded by wire netting or lattice work to prevent accidents.

XXIII. Miscellaneous Points.

An operation room and mortuary are provided in hospital ships, but are hardly necessary on board transports.

An open rack is provided on the hospital deck of some transports for the stowage of the wash-deck gear; this is not a satisfactory arrangement, and the gear in question might be more suitably kept in a special cupboard beneath the companion-ladder, or in some other suitable recess.

Hooks for the patients' clothing are usually distributed throughout the hospital in convenient places, and are very necessary.

The iron deck forming the ceiling of the hospital should be painted with "cork-paint" to prevent condensation of moisture.

XXIV. Hospital Accommodation in Troop Freight Ships.

Before concluding this Report I should like to make a few remarks on the fitting of hospitals on troop freight ships. These ships often carry 300 to 400 troops or more, and are provided with the barest necessities in the matter of hospital accommodation, viz., the authorised number of berths, a bath with two basins fitted over it in a wooden frame, one or two w.c.'s, and a dispensary. The

hospital is usually fitted up in a corner of a troop-deck, and is partitioned off by wooden bulkheads, through the windows and openings of which it communicates freely with the troop-deck. The following are some of the other defects which I have observed in inspecting these ships. The cots are always arranged in two tiers, and have no cot tables ; no cupboards are provided in the hospital for the patient's medicines or medical comforts, and no store-rooms outside for hospital stores ; narrow doorways, and other obstructions, as well as steep and narrow gangways, render the disembarkation of stretcher cases very difficult in many instances ; no portable electric fans are provided ; the bath is, as a rule, supplied with cold salt water only ; the dispensary is often too small to admit the regulation pattern medicine chest, and has no water supply laid on ; in some of these ships no separate mess is provided for the detachment of the Royal Army Medical Corps, and the mess table accommodation for patients is very deficient. I do not of course expect to see these ships, whose hospital arrangements are only of a temporary nature, fitted up like transports, but I think a rather higher standard of hospital arrangements than is found at present might reasonably be attained.

A CASE OF NEURECTOMY OF THE SCIATIC NERVE.

BY LIEUT. WALTER C. STEVENSON.

Royal Army Medical Corps.

THE following is an account of an operation undertaken to save the limb of a patient who came to the Royal Infirmary, Dublin, to have his leg amputated, as he said it was useless and only gave him pain.

He was suffering from the effects of a gunshot wound received two years ago, which involved the sciatic nerve.

In rendering this report I wish to express my thanks to Lt.-Col. MacNeece, R.A.M.C., for his advice, and to Mr. W. S. Haughton, Visiting Surgeon, Dr. Steeven's Hospital, Dublin, for his suggestions and assistance during the operation.

No. 4609. Private P. P., late Royal Irish Regiment, aged 29. Service eight years.

January 7, 1901.—Wounded in three places by Mauser bullets at Belfast in South Africa.

(1) Left buttock. Healed in South Africa.

(2) Right buttock. Healed in South Africa. Bullet removed at Netley, June 3, 1901.

(3) Right thigh. Bullet entered back of thigh 4 inches above knee joint. Smashed the bone. Emerged 3 inches higher up in front of the limb. Complete loss of power in the limb below the knee. Anæsthesia of outer half of leg and whole of foot except in front of internal malleolus. Sensation over distribution of internal saphenous nerve normal. Thigh muscles slightly atrophied from disuse, but otherwise normal.

Circumference of R. Thigh just above Patella ...	...	12½ ins.
" " L. " " " ...	...	14 "
" " R. " greatest ...	...	17¾ "
" " L. " " " ...	...	19½ "
" " R. Calf " " " ...	...	10½ "
" " L. " " " " " ...	...	12 "

He has use of the knee joint. The loss of function exactly corresponds to the distribution of the branches of the sciatic nerve below the bullet injury in the thigh. This wound healed quickly in South Africa. Fracture treated in box splint at No. 7, General Hospital, Pretoria. Firm osseous union established with 1½ inches shortening.

August 30, 1901.—Invalided from the service at Netley.

October 24, 1901.—Fitted with a boot and discharged from Netley.

January 2, 1901.—Admitted to Waterford Infirmary with trophic ulcers in the right foot. Towards the end of that month Dr. Mackesy, Surgeon in Charge, operated on the patient's sciatic nerve and removed his great toe. I quote an extract from a letter for which I am indebted to the courtesy of Dr. Mackesy.

"In the case of P. P., the nerve when cut down on, at Infirmary, was found intact. Cicatricial tissue about it. Wound was closed and healed satisfactorily, but no improvement followed the operation. Toe was amputated, as it was much hypertrophied and gave discomfort in boot."

February 22, 1902.—Patient discharged from Waterford Infirmary. After three weeks, trophic ulcers commenced again in the right foot. These healed with rest in bed, but when patient was about for a few days they recurred.

Patient applied for admission to a Military Hospital to have his leg amputated.

November 20, 1902.—Patient admitted to Royal Infirmary, Dublin. He was then suffering from trophic ulcers under the heads of the metatarsal bones of the great and little toes. These healed in a fortnight under appropriate treatment.

No functional improvement in the limb followed massage and electricity (application of Faradic current twice daily for fifteen minutes); but limb increased in girth.

Above the entrance of the bullet a swelling could be felt on the sciatic nerve, especially with the aid of the patient, who complained of pain when this was handled. It was also very sensitive to electrical stimulation.

Operation.

December 19, 1902.—Longitudinal incision $2\frac{1}{2}$ inches in length through the skin of back of thigh. Incision parallel and $\frac{1}{2}$ inch internal to that used by Dr. Mackesy.

Large amount of scar tissue encountered. Nerve exposed and cleared with great difficulty at the site of the bullet track. On first inspection no apparent breach of continuity of the nerve trunk at this point.

Skin incision prolonged $1\frac{1}{2}$ inches upwards and 1 inch down-

wards along the nerve, which was in all exposed $4\frac{1}{2}$ inches. This procedure was deemed necessary to ascertain whether the nerve had been divided by the fracture, or injured by a spicule of bone which projected backwards.

On closer examination of the nerve its longitudinal fibres could be traced to the region which the bullet traversed. Here they ended in the neuromatous enlargement described above. One and a half inches below this a less distinct enlargement was present, succeeded by nerve tissue with the usual longitudinally striated appearance. The lower portion of the nerve was smaller and less firm to the touch than the upper segment. Between these two enlargements the continuity of the trunk was maintained by a structure which had the consistence and appearance of scar tissue, its fibres running in every direction. It had also firm fibrous union with the surrounding cicatricial tissue.

As Dr. Mackesy's operation of freeing the nerve from the scar had no beneficial result, it was decided to excise the apparently functionless portion of the nerve trunk, and to unite the healthy ends of the nerve together.*

Rather less than two inches of the trunk were removed, including the two enlargements.

NAKED EYE APPEARANCE OF THE CUT ENDS OF SCIATIC NERVE.

Upper Segment.—Arteria comes nervi ischiadici bled freely (a satisfactory point in considering the future nutrition of the lower segment). Nerve fibre bundles visible. A few of these appeared as if they had been cut through the position where they turned back to form the neuroma usually described as taking place at the proximal end of a severed nerve.

Lower Segment.—Nerve fibres separated into the two large bundles of the external and internal popliteal nerves, but still surrounded by a single sheath holding them together.

* The sciatic nerve of a sheep was procured for a graft in case it might be impossible to bring the ends of the patient's nerve together. The sheep was killed in my presence at 9.30 a.m. One hind quarter was removed and seared along the spinal canal. The limb was delivered in the operating theatre of the Royal Infirmary at 10.10 a.m. The surface of the leg was now seared, and the sciatic exposed with aseptic precautions, as for an operation on the living subject. The nerve was left *in situ*, the muscles being drawn over it, and the whole leg wrapped in a sterilised towel till it should be required. If necessary in this case the sheep's nerve would have been grafted about two hours after the animal was killed.

The divided ends were easily held in apposition by four Kocher's forceps, one grasping the nerve sheath at either side of each segment.

The nerve was darned together in the following manner, using a continuous No. 0 catgut suture prepared by Dobbin's formalin method. A fine full curved needle was passed from behind forward through the centre of the lower segment; then through the upper segment in a like position, but in the opposite direction. Suture tied, leaving the threaded end long. Similar stitches alternately through the segments, three about $\frac{1}{2}$ an inch, and four $\frac{1}{4}$ of an inch from the cut ends. Four more stitches to bring the nerve and its sheath accurately together. The long end of the suture finally tied to the short end. By this procedure good union of the nerve was obtained without any strain on it.

Two deep No. 1 silk sutures were passed through the hamstring muscles and tied loosely, in order to cover in and protect the nerve.

Silkworm gut sutures used for the skin incision.

Dressings.—Dry sterilised gauze covered by cyanide wool.

MacIntyre's splint applied to the limb in a flexed position, to prevent tension on the nerve.

Anæsthetic.—Nitrous oxide followed by ether.

December 19, 8 p.m.—Patient experienced some pain during the day, which was relieved by $\frac{1}{4}$ grain of morphia hypodermically.

December 20.—Patient complained of great pain on the slightest movement, which he states shoots from the heel into his great toe. This is probably due to stimulation of the upper segment.

December 23.—Wound dressed. Looked quite healthy. Limb put up in flexed position in plaster of Paris.

December 28.—Window cut in plaster and skin sutures removed. Wound healed by first intention.

Patient is gaining flesh. He still complains of a pain radiating from his heel to his toes on moving the limb; also occasional pain in the shin. Right foot continually warmer than the left and suffering from no trophic lesions. There is no return of function to the limb, which cannot be expected for three months, according to the dictum of Waller.

SOME RARE OCULAR MANIFESTATIONS OF VENEREAL DISEASE.

By MAJOR M. THOMAS YARR,
Royal Army Medical Corps.

THE following brief notes of cases recently under my care may prove of interest to readers of the Journal :—

HARD CHANCRE OF THE EYELID.

Private W., a healthy-looking lad, aged 18½, consulted me on March 1, 1903, with a view to obtaining some treatment for a sore on the right lower eyelid, which he called a "stye." The inner third of the margin was irregularly eroded, as though bitten by an animal, and the whole depth of the lid swollen and indurated; on eversion a pinkish-yellow, granular-looking, glazed ulcer with raised edges could be seen extending to the bottom of the fornix. There was practically no discharge, and the bulbar conjunctiva was unaffected. He stated that about a month before he felt a little itching at the inner corner of the eye; the lid remained red and irritated for some days, and then very slowly a little pimple formed, which after increasing to the size of a pea, "broke," leaving the present condition of things. Within the last week he noticed tenderness and swelling of the right pre-auricular gland and of two glands behind the angle of the jaw. He had four months' service, had never been in hospital, and denied all contact with women.

I had no doubt whatever in my own mind as to the specific nature of the case, for a more typical primary sore I have never seen. I admitted him to hospital and at once began mercurial inunction, contenting myself as regards local treatment with a boric lotion and protection of the eye. The effect of the mercury was magical; the ulcer began to heal almost immediately, and had disappeared, leaving a puckered cicatrix, and of course loss of cilia, by March 11; the induration of its base and the swelling of the glands, however, subsided very slowly, and could still be felt quite six weeks later. The gums were slightly tender three days after admission and were kept so for six weeks.

On March 14, a fortnight after admission, and following days, a faint but unmistakable roseolar syphilide appeared on chest, arms, and thighs, accompanied by small superficial painless ulcers of the fauces, and thus definitely established the diagnosis. These secondary manifestations, the only ones, subsided quickly. I kept

him in hospital under specific treatment until May 5, when he was discharged to rejoin his regiment, which in the meantime had been moved to Norwich. The subsequent history of this case will, I hope, be noted and sent to me. I shall be particularly interested in watching for any implication of the cornea of the same eye, in view of the fact that at least two of the cases of acquired syphilitic interstitial keratitis recorded followed primary sores of the eyelids.¹

The case was exhibited and discussed at the March meeting of the Aldershot Military Medical Society.

Cases of primary sore of the ocular adnexa cannot be said to be of extraordinary rarity in civil life, but this is the first one I have met with in the Army. The most common site appears to be the eyelids, though cases have been recorded of chancres in the upper retrotarsal fold, bulbar conjunctiva, and even in the lachrymal sac.² An interesting case in a child, aged 3, which was under observation for upwards of three years, has been recently recorded by Dr. Fritz Weber, of Zurich.³ Mr. Simeon Snell has seen no less than twenty cases in Sheffield, and is inclined to attribute some of these at least to the fact that in each of the large iron-works there, there are certain workmen who have reputations for removing foreign bodies from the eye, whose methods, though remarkably successful, are somewhat crude.

INTERSTITIAL KERATITIS DUE TO ACQUIRED SYPHILIS.

In view of the rarity of this condition, and the desirability of establishing by records of cases a typical symptom-complex, I give notes of the following case, in which interstitial keratitis appeared as a late secondary phenomenon.

Private P., a robust man aged 25, with excellent teeth, and free from all evidences of hereditary syphilis, reported sick on December 30, 1902, complaining of slight dimness of vision in his left eye. On examination a small faint grey semilune of infiltration was seen in the lower part of the cornea, somewhat resembling part of a badly-marked arcus senilis; the cornea above as high as the pupil margin looked dull; below it was some slight ciliary congestion; vision $\frac{1}{2}$ badly, tension normal. The iris was normal in colour; the pupil reacted well and equally to light, and dilated freely and circularly to a mydriatic. The right eye was normal. He had had a primary sore on the penis five years before, followed by roseola and papulæ; his eyes had not then, or previously, been affected. He was admitted to hospital and ordered atropine and a pressure bandage, with iodide of potassium internally. The

corneal infiltration slowly and painlessly increased, always preserving a fairly regular semilunar form, until it reached its maximum some six weeks later.

On February 9, 1903, I noted the condition of the eye as follows : Grey, ground-glass infiltration of the cornea, homogeneous, and apparently affecting the entire thickness as seen with a magnifier ; semilunar in shape, symmetrical, the horns of the semilune extending up to the horizontal meridian on either side, the lowest part of the cup about half that distance ; free edge fading gradually away into dulness and loss of sheen ; upper third of cornea clear ; ciliary congestion below, not severe ; no vessels in the infiltration. Vision $\frac{5}{80}$; no pain ; no increase of tension ; pupil well and circularly dilated ; no resemblance to keratitis punctata.

From this date the infiltration slowly retrogressed, somewhat patchily, from above downwards, treatment remaining unchanged. He left hospital on March 20, with vision $\frac{3}{4}$ and slight "buffing" of the lower third of the cornea. As his regiment proceeded to another station I have not been able to see him since.

Interstitial keratitis in acquired syphilis is a very rare phenomenon. Nuel, in an exhaustive monograph on corneal diseases,⁴ remarks : "It is a curious fact that syphilis in the adult very rarely attacks the corneal tissue, though it so frequently affects the iris and even the whole uveal tract." Mr. Jonathan Hutchinson also emphasises its rarity :⁵ "The occurrence of syphilitic keratitis in connection with acquired syphilis is exceedingly rare. I have not myself seen more than three or four cases in which there was any reason for diagnosing such a condition, and in most of these the affection was very slightly marked and transitory." Of the few recorded cases, Mr. Hutchinson's⁶ is perhaps the most remarkable. The cornea was invaded by curiously symmetrical striæ, concentrically arranged ; there were repeated relapses, but the patient ultimately recovered with almost perfectly clear corneæ. Mr. Lang's case has been alluded to (*vide supra*). Mr. Lawford published notes of five cases in 1900,⁷ but in two of these he admits the syphilitic origin to be "open to question." It is a curious fact that in Mr. Lang's case and one of Mr. Lawford's cases, the primary sore had been in the conjunctiva of the affected eye : in both of these cases the keratitis was a very early secondary, in all the others a late tertiary, lesion. In all the published cases vascularity has been slightly marked or absent, though in one a distinct "salmon patch" was seen.

GONORRHOEAL IRITIS.

Cases of gonorrhœal iritis are perhaps not very rare, but they are certainly rarely diagnosed. The following case is of interest, as it shows the importance of considering the possibility of gonorrhœal origin in cases of intractable relapsing binocular iritis.

Private McQ., aged 20, a pallid but well-nourished lad, was admitted on February 2, 1903, suffering from severe iritis in the right eye. Intense ciliary injection, photophobia, already numerous fine synechiæ, and a film of peculiar greenish lymph in the pupillary area. There was, however, curiously little change in the colour of the iris and no turbidity of aqueous. He said the eye had only been bad two days. Vision, fingers at 2 ft.; pain severe both in eye and temple day and night; tension normal. Inquiry elicited the fact that he had had a sore on the penis fourteen months previously, not followed by secondaries; this was verified by his medical history sheet. I somewhat hastily assumed that the iritis was syphilitic, though its advent was unusually late, and ordered mercurial inunction, with atropine and hot fomentations to the eye. The gums were touched in four days' time, but the iritis was practically unchanged, if anything a little worse. Three days later, February 9, his left eye showed signs of injection, and next day was affected with an iritis almost the exact counterpart of the other, but with less effusion. Pains in the temples and eyes were now very bad, and the patient could not sleep without an opiate. On February 18 the left eye began to improve, followed a day or two later by the right (the first attacked); the effused lymph melted away with extraordinary rapidity, and on February 28 I noted: "Vision, R. $\frac{6}{20}$ and L. $\frac{5}{20}$; red reflex; faint vitreous opacities; no pain; slight injection." He continued to improve until March 6, when he complained of pain in both eyes, and also, for the first time, of dull aching in the left knee and ankle. Next day both irides were again inflamed, but not so severely as at first, and the knee and ankle slightly swollen. The latter condition had a suspiciously familiar look, and I closely cross-questioned him for the first time as to gonorrhœa. He admitted that he had had a running six months before, which he had treated himself with an injection obtained from a chemist, and examination showed he had still a slight gleet. He also stated that while on furlough at Christmas he had been laid up a week with stiffness of the left ankle and tenderness of the sole of the same foot.

The gonorrhœal origin now seemed pretty clear, and the con-

stitutional treatment was changed to salicylate of soda, 10 grains every three hours, with local treatment for the rheumatism and gleet, which I need not enter into. Improvement in the iritis set in almost immediately, and on April 1 vision was R. $\frac{1}{18}$, L. $\frac{1}{12}$ partly; pain and injection gone. The gleet and joint pains also subsided quickly, but stiffness and lameness persisted for a long time. He had a slight relapse of the iritis in the right eye early in May; since then the eyes have given no trouble and the general health is greatly improved. I have, however, proposed him for invaliding, as unlikely to be efficient as a soldier, in view of the liability to relapse characteristic of gonorrhœal iritis. His vision is now, R. $\frac{1}{18}$, L. $\frac{1}{12}$; numerous fine synechiæ; some spots on lenses, but on the whole wonderfully little trace of the effused lymph; punctate opacities on the back of lower third of right cornea.

The late Mr. John Griffith was one of the first to focus the attention of ophthalmic surgeons on gonorrhœa as an occasional cause of iritis in his able paper on "Iritis a Sequel of Gonorrhœa," read before the Ophthalmological Society in 1899.¹ In the discussion which followed his paper Mr. Treacher Collins referred to an interesting investigation he had made into the constitutional history of 100 cases of iritis. Out of these 100 he found that iritis had commenced in connection with gonorrhœal arthritis in no less than fourteen; he had never met with a case of iritis which he could attribute to gonorrhœa without any arthritis. Since that date I have endeavoured to keep always before me this possible origin of obscure atypical cases of iritis; yet, as may be seen, the true nature of this case escaped me until forced on my attention by the concurrence of the arthritis. I have only seen two previous cases in which the diagnosis was fairly certain; one was monocular, the other binocular, but both had certain features in common with this, notably the numerous thready synechiæ, the greyish-green effused lymph, and the tendency to involve the pupillary edge of the iris chiefly, leaving the rest but slightly involved.

REFERENCES.

- ¹ "Interstitial Keratitis in Acquired Syphilis," Lang, *Trans. of Ophthal. Soc.*, vols. xi. and xii.; Lawford, ditto, vol. xx.
- ² *Trans. of Ophthal. Soc.*, vol. xxi.
- ³ *Knapp's Archives*, November, 1902; also *Arch. f. Augenheilk.*, xlv.
- ⁴ "System of Diseases of the Eye," edited by Norris and Oliver, vol. iv., p. 231.
- ⁵ "Monograph on Syphilis" (Cassell and Co.), Commentary xciii.
- ⁶ *Op. cit.*, Commentary xciv.
- ⁷ *Trans. Ophthal. Soc.*, vol. xx., p. 67.
- ⁸ *Trans. Ophthal. Soc.*, vol. xx.

REPORT ON THE MEDICAL RELIEF EXPEDITIONS TO MARTINIQUE AND ST. VINCENT IN AID OF THE SUFFERERS FROM THE VOLCANIC ERUPTIONS OF MAY, 1902.

By MAJOR J. WILL.
Royal Army Medical Corps.

INFORMATION of the disaster which had overtaken St. Pierre by the eruption of Mount Pelée on May 8, was brought to St. Lucia on the evening of the same day by the ill-fated s.s. "Roddam."

The news reached Barbados by the R.M.S. "Esk" on the morning of the 10th. As details of the catastrophe could not be obtained, the cable being interrupted, it was supposed that probably some of the inhabitants had escaped destruction, but may have been injured or burned.

A relief expedition was immediately organised by His Excellency the Governor of Barbados.

Having obtained short leave to visit Barbados I arrived there by the R.M.S. "Esk" on the 10th, and was asked by the Government of Barbados to join the relief expedition. With the approval of the officer commanding troops I did so. The expedition left Barbados at 7 o'clock on the evening of the same day in the R.M.S. "Solent."

The medical party consisted of myself, Major Bent, one N.C.O., and four men of the Royal Army Medical Corps, Drs. Manning, Hutson, and Aughinbaugh, and three trained nurses, with surgical materials, hospital marquees, beds, &c. The expedition was under the direction of the Hon. F. J. Newton, Colonial Secretary, Barbados.

We arrived at Fort de France at 7 a.m. on the 11th, and after interviewing the officials proceeded to St. Pierre, which was reached at 11 a.m.

As we steamed along the coast from Fort de France the landscape appeared to be little altered, only a very thin sprinkling of dust had fallen, not enough to obscure the verdure of the tropical vegetation on the hillsides or of the fields of sugar-cane in the valleys; but on reaching a point opposite Carbet—a village about one and a-half miles south of St. Pierre—the aspect of the country assumed a complete change. The vegetation was covered up with

ashes, and everything coated with dust. The village seemed deserted, but the houses appeared to be intact.

From this point northwards the country presented the appearance of being in the middle of a severe winter, everything green had disappeared, the trees were bare and gaunt with the smaller branches broken off, and the ground looked as if covered to the depth of 12 or 18 in. with dirty grey snow.

On entering the harbour of St. Pierre the charred timbers of wrecked vessels were passed, and further in the Bay lay the s.s. "Roraima," still burning, with volumes of smoke rising from her hatches. Her hurricane deck and upper gear were gone; the starboard plates were buckled inwards, and from the fire inside, the plates on both sides were red hot, sending up clouds of steam as the waves lapped against them.

The town of St. Pierre was covered with a thin mantle of smoke, above which the outline of the hills was distinctly visible, and to the north, almost over our heads, Mount Pelée, its volcano still active and sending up a dense cloud of smoke. Below this cloud of smoke a stream of hot mud could be seen rushing down the mountain side to the sea, sending up huge volumes of steam where it passed into the water.

On the hill-side above the southern end of the town was the pedestal of the statue of the Blessed Virgin, the statue itself had been thrown from its pedestal some thirty or forty yards in a southerly direction. Every house was roofless, the walls were still standing, and in many of the houses flames were seen rising from the burning woodwork.

When the "Solent" came to anchor, a boat was lowered, and a search party landed. The scene on shore was one of utter ruin and desolation. The large tamarind and bearded fig-trees in the Place Bertin were uprooted and thrown towards the south, and the broken boughs strewed the foreshore. The streets were covered to the depth of two feet with rubbish which had fallen from the tops of the walls of the roofless houses. Nowhere had volcanic ashes fallen to a greater depth than an inch.

At every turn scenes of indescribable horror met the eye. Dead bodies lay scattered about, singly and in groups, most with the face to the ground, and many with the face resting on the forearms or covered with the hands. With one exception all the victims were devoid of clothing. This exception appeared to be a white man.

probably a sailor, who had escaped from one of the burning ships, He was lying on the face with his jersey pulled over the head.

A brief examination was made of a number of the victims. In many there were no signs of actual burning, they appeared shrunken, dried up, and mummified. On the other hand some were terribly charred, the flesh being in parts entirely consumed, exposing the bones of the limbs and skull. There was no stench, only a faint odour of burning flesh.

For a town of 26,000 inhabitants of whom not a single soul escaped, the number of bodies seen in the streets was comparatively small, and even in the houses, where no doubt the majority had sought refuge from the burning ashes, few bodies were seen. It seemed evident that the majority of the victims had been buried under the fallen and burning roofs, and that large numbers must have been entirely incinerated.

The heat was intense. Progression through the streets was difficult and extremely dangerous; the walls of the houses were fissured and in many places overhanging, and iron railings were twisted and bent in every direction, and in several of the streets barred the passage.

It was noted that most of the clocks on the public buildings had stopped at 7.50, marking the hour at which destruction had overtaken the doomed city.

It soon became evident that the people of St. Pierre had passed beyond the reach of human aid. The party therefore returned to the ship, glad to escape from the heat and from scenes so terrible.

It may never be known exactly what was the immediate cause of the comparatively sudden extermination of nearly 30,000 people, and the simultaneous ignition of every house in St. Pierre.

The volcano on Mount Pelée became active on April 15, and on May 5 erupted large quantities of steam and mud, the latter, rushing down the mountain side with enormous velocity, buried completely a sugar factory situated at the base of the mountain. Its violence was then supposed to be spent, but on the evening and night of May 7 rumbling noises were heard in the mountain, and dense volumes of smoke ascended from the crater. On the morning of the 8th dust and small stones fell on St. Pierre, the underground rumblings became more continuous, and at about 8 o'clock with a terrific explosion an avalanche of hot ashes and sand mixed with flame was hurled from the mountain top into

the town. This blast must have travelled with tornadic velocity, as evidenced by the uprooted trees in the Place Bertin. Some of the eye-witnesses of this terrible catastrophe state that the top of the mountain was blown off, others say that the tornadic blast came from a new vent in the side of the mountain. The volcanic ejectamenta seem to have consisted of fine dust, sand, super-heated steam and gases, and were highly charged with electricity. The manner in which iron railings were twisted would indicate the presence of a large quantity of electricity, probably generated by the intense friction of the particles composing the hot blast. The nature of the gases can only be conjectured, but were probably sulphur-dioxide and hydrochloric acid gas. An intense degree of heat is capable of dissociating the elements of water, the free hydrogen at a high temperature explodes on coming in contact with the oxygen of the air, exhausting the oxygen in the vicinity, and raising the temperature after the manner of the oxy-hydrogen blowpipe.

The material which destroyed St. Pierre must have been heated to a very high temperature, this is evident from its having ignited everything combustible, including clothing, which is capable of resisting a temperature of nearly 300° F.

The death of the majority of the inhabitants of St. Pierre does not seem to have been by any means instantaneous. Doubtless many were killed instantaneously by lightning, but the greater number would seem to have been suffocated by the intense heat and dust.

The "Solent" returned and landed some food supplies at Fort de France. It was there ascertained that medical assistance was not required, there being in hospital only eighteen injured people who had been rescued by the "Suchet" from the shipping at St. Pierre.

The expedition returned to Barbados, arriving at 10 a.m. on the 12th.

About midday on the same date (12th) telegraphic information was received in Barbados of the extent of the calamity which had overtaken the inhabitants of St. Vincent by the eruption of the Souffriere mountain on the 7th, and medical assistance was asked for.

At 3.30 p.m. Colonel Booth, the officer commanding the troops, asked me by telephone if I would proceed to St. Vincent the same evening. I was informed that civilian medical aid could not be

obtained. I therefore left Barbados at 5 p.m. on the 12th by the R.M.S. "Eden," taking with me a detachment of the Royal Army Medical Corps, a case of surgical dressings, stretchers, and a large hospital marquee.

Arriving at Kingstown, St. Vincent, at 6 a.m. on the 13th, after an interview with His Excellency the Governor of the Windward Islands, who informed me that the eruption of the Souffriere had caused the death of 1,600 people besides 160 cases of severe burns which were collected in temporary hospitals in Georgetown, only six of whom were expected to recover, I proceeded to Georgetown in H.M.S. "Indefatigable." I found that the total number of burns admitted to the hospitals had been 178, of whom thirty-four had already died.

The temporary hospitals were three in number, viz., (1) Georgetown Hospital, a small two-storey building containing forty-one patients; (2) "Biddy's," also two storey, the upper floor being occupied by sixty patients; (3) "Balcombs," the ground rooms in this building contained forty-three patients.

The available medical staff consisted of two doctors, five nurses and one dispenser. This limited staff could not be expected to cope successfully with 200 cases of extensive burns, and it was not a matter for surprise to find the atmosphere in some of the rooms far from sweet. None of the sufferers had fewer than four extensive burns, and some as many as ten. The accommodation was much too limited, and having ascertained that more suitable houses could not be procured in Georgetown, I proposed to transfer as many as could be safely moved to hospital marquees in Kingstown. For this purpose Captain Campbell ordered the boats of the "Indefatigable" to be lowered and a number of suitable cases were selected, but the surf was running so high that it was found impossible to put any on board. I therefore returned to Kingstown and arranged for carts to bring as many as possible on the following day, also telegraphed to the officer commanding troops, Barbados, for bedsteads, mattresses, waterproof sheets, hospital marquees, old clothing, and a further supply of dressings.

On the following day the large hospital marquee was pitched and equipped with twenty-six beds borrowed from the Police Barracks, and received sixteen cases of burns brought by the coasting steamer "Wear" from Fancy, a village at the extreme north of the Island, also eight cases from Georgetown transported by the carts.

Dr. Offord arrived from Grenada and proceeded to Georgetown. In the evening the "Indefatigable" left for Barbados to bring the supplies telegraphed for.

On the 15th more cases were transferred by carts from Georgetown and temporarily accommodated in a ward of the Colonial hospital.

At daylight on the 16th the "Indefatigable" returned from Barbados with the supplies requisitioned for, and later H.M.S. "Pallas" arrived bringing dressings and surgical materials.

Drs. Hutson and Bowen and a native dresser arrived by the "Indefatigable" from Barbados in response to a telegram sent by His Excellency asking for two doctors and six nurses. Drs. Hutson and Bowen, the native dresser, and three men of the Royal Army Medical Corps, proceeded to Georgetown on the "Wear," taking a supply of beds, &c., and three hospital marquees, also a detachment of bluejackets from the "Pallas" to assist in pitching the latter. These marquees were pitched on an open piece of ground close to the sea-shore, and accommodated thirty patients. "Biddy's," a building quite unsuited for hospital purposes, was evacuated.

Dr. Durant was in charge of the patients in the hospital, Dr. Offord of those in Balcombs, and Drs. Hutson and Bowen of the three marquees.

Another hospital marquee was erected in the hospital grounds at Kingstown, and was occupied by eight women and seven children.

On the 21st and 23rd thirty-two more cases were transferred to the marquees in Kingstown.

On the 24th the U.S.S. "Dixie" arrived, bringing provisions, clothing, medical stores, and four hospital marquees equipped with beds, &c. Medical assistance was also offered, there being on board four U.S. Army doctors, and six trained men of the hospital corps, but at this stage medical assistance was not required. The marquees were pitched alongside the others in the hospital enclosure at Kingstown, and with the additional accommodation they afforded, permitted all the cases remaining in Georgetown, except two, to be brought to Kingstown. The last of these cases was transferred on May 30. The two cases left in Georgetown were too seriously ill to be removed. Both died a few days later. On this date there were seventy-six cases in the Relief Hospital

in Kingstown, thirty-nine had been discharged cured, and seventy-nine had died.

Dr. Offord returned to Grenada on May 29, and Drs. Hutson and Bowen to Barbados on June 5.

The table below shows the number of injuries caused by the eruption of the Soufriere Mountain on May 7, with the admissions, recoveries, deaths, &c., up to June 20, the date on which I left St. Vincent.

	ADMITTED	ATTENDED FOR DRESSING	RECOVERED	DIED	REMAINED ON 20TH JUNE
Burns (severe)	191	—	88	79	24
„ (mild)	—	30	30	—	—
Other injuries	3	—	1	1	1
Totals	194	30	119	80	25

Of the 194 cases admitted to hospitals, fifty-six were men, ninety-eight women, and forty children under 14 years of age.

Of the twenty-five cases remaining under treatment on June 20, probably twenty will be fit to be discharged in the course of seven or eight days, and all are likely to recover.

The thirty cases shown as attending daily for dressing, were mostly mild and superficial burns of the backs of the hands and ankles. All recovered.

The 191 severe cases of burns admitted were characterised more by the extent of the areas implicated than by the depth of destruction of the affected surface.

The sites were chiefly the face, ears, neck, forearms and backs of the hands, the legs and feet, and about 20 per cent. had body burns as well, situated in most of these cases on the shoulders and buttocks.

In one case only there were as few as two burns, the majority had at least four, and some as many as eight or ten.

The degree of burn varied from destruction of the cuticle to that of the true skin and subcutaneous tissues. The latter degree occurred in five cases only, implicating in two of these the ankles, in two the extensor tendons of the fingers and in one the finger

tips. In most of the cases several of the degrees were combined in the surface affected. All the cases when first seen had an adherent coating of fine dust.

In consequence of the degrees and extent of the injuries, pain was intense. There was a remarkable absence of shock, which is always an invariable sequel of intense burns in Europeans. Its absence may be accounted for, either by the lower nervous organisation of the coloured race, or by the fact that the injured received their burns between 3 and 4 p.m. on the 7th, and were not removed to hospital till next morning. It is probable that some may have succumbed to shock in the interval. On the other hand, many of those who had sustained the most extensive and severest burns started at daylight on the following morning and walked to Georgetown, a distance in several instances of seven miles. It may therefore be assumed that shock was not a prominent feature, and to its comparative absence must in a great measure be ascribed the large number of recoveries.

The total number of deaths resulting from injuries caused by the eruption was eighty, of which seventy-nine were due to burns. The immediate cause of death was in most of the cases exhaustion from septicæmia, a result it was impossible to obviate owing to the extent of surface involved in each case. A few died from secondary complications, viz., pneumonia and pleurisy, and four from tetanus.

The treatment adopted was in the main thorough cleanliness, effected by washing the wounds after removing all loose epidermis with 1 in 80 carbolic lotion, or with hydrozone, and applying at first a dressing of 2 to 6 per cent. turpentine in oil, and later, when this became too stimulating, a liniment composed of petrolatum and albolene, with $1\frac{1}{2}$ per cent. of trikresol.

Anæsthetics had to be used in several cases while removing dressings.

Skin-grafting was successfully carried out in a few cases in whom the entire skin was destroyed.

The food was adapted as far as possible to the requirements of each case, and to their previous dietary habits. Stimulants, milk, beef essence, soups, jellies, &c., were freely prescribed when considered necessary.

The other injuries resulting from the eruption and treated in hospital were three cases of fracture of the skull, all in children.

CASE 1.—A Carib girl, aged 9, was carrying on her head a wooden tray on which a large stone fell, breaking it and fracturing the upper angle of the frontal and both parietal bones, the latter just above the eminence. The frontal fracture was comminuted and slightly depressed, and over it were two minute wounds which bled very profusely. She was unconscious for forty-eight hours, and when consciousness returned had complete loss of speech and hearing and considerable paresis, especially of the lower extremities. The injury was considered too extensive for operation. The paresis gradually disappeared, speech and hearing returned, and after being eighteen days in hospital she was discharged, apparently quite recovered.

CASE 2.—A negro boy, aged 9, by the direct impact of a large stone sustained a large scalp wound with fracture and depression of the parietal bone close to the vertex. When admitted the wound was very septic, and while this was being prepared for operation he developed tetanus and died.

CASE 3.—A coloured girl, aged 8, came by her injury in a similar manner to Case 2, resulting in a comminuted and depressed fracture of the left parietal bone, close to the sagittal suture, with two small scalp wounds over the fracture. This case was operated on. Three fragments of bone were removed and the depressed margin elevated. It continued to do well.

To arrive at some definite conclusion as to the cause of these extensive burns and of the loss of 1,600 lives, it will be necessary to consider briefly the phenomena observed during the eruption, and the statements made by the surviving sufferers.

The Soufriere Mountain on which the volcano is situated is the northern portion of a volcanic range running almost due north and south, and dividing the whole island longitudinally into two parts, known as the windward and leeward portions. The volcano consists of two craters, the old and new, the date of origin of the former is unknown, and the latter is supposed to have come into existence during the last eruption in 1812. The craters are separated by a narrow saddle-ridge and are approximately 3,000 feet above the sea level. For some months prior to the date of the eruption rumbling noises had been heard in the mountain. On May 6 these noises became more continuous and louder, and on the afternoon of that day a huge vertical column of steam was ejected with a noise like the report of a cannon. Explosions,

with discharge of vapour occurred during the night, and on the morning of the 7th black material was seen to be thrown up at each discharge, some of it falling back again into the crater. These discharges occurred intermittently but with increasing violence till about 1 p.m., when they became continuous with a thunder-like noise, or, as it has been described, like the roar of a mighty torrent, and a huge mushroom-shaped cloud of black smoke, intersected in every direction with electrical flashes, rose many thousand feet into the sky. This huge mushroom-shaped cloud seems to have divided into two parts, one passing to windward over the sea, and the other to leeward. About 2 p.m. large stones fell to the windward side and the cloud, which passed in that direction, returned to a certain extent towards the crater, probably drawn thither by a temporary vacuum in or near the crater caused by the explosion of a volume of inflammable gas. This will account for the condition of the windows observed in Georgetown, where all the glass was broken on the windward side; that on the side next the crater had sustained little damage.

The volcano seems to have reached its acme of violence about 2.30 p.m., and about 3 o'clock the wave of hot air and ashes overtook the inhabitants of the Carib country, the district between Georgetown and Owia, killing about 1,600 people, also thousands of domestic animals, while most of the survivors were terribly burned.

Fortunately the inhabitants of the district to the leeward of the mountain became alarmed by the explosions of the previous night, and sought safety in flight before the fatal stage of the eruption was reached, hence no human lives were lost in this portion of the island; everything in the shape of stock, &c., was killed and completely buried by the mud and ashes.

The personal narratives of most of those treated in the hospitals were taken, they agree on all the main points, it will therefore be sufficient to quote one only, and that in his own words.

Charles Alexander, aged 40, labourer, stated: "I lived at Overland. On the morning of the eruption I was cutting canes on Tourama Estate. About 9 o'clock there was a drizzle of rain with ashes falling, but I still goes on work, then ashes fall heavier. About 12 o'clock I start to go home, the ashes still fall and small stones, and when I get home I hear a great noise in the direction of the mountain like a rushing river. All the people then start to

run from the village, Tourama way, but when we get half part of the way we turned back because we meet the Tourama people coming to Overland. As soon as we reach Overland again, large stones begin to drop, and this cause all the people run into the houses. With many others I run into Victor Sutherland's shop. It have a strong galvanised roof but soon some large stones fall through the roof. About 2 o'clock great darkness come on and we shut the doors and windows. After this a great heat come with hot ashes through the chinks of the doors and windows and through the holes in the roof. The hot ashes get into our mouths, and stop our mouths as fast as we try to breathe. We toss backwards and forwards for about two seconds, then everyone fall down. I did not lose my senses, but cannot tell exactly what happened after I fall. I feel choked with the hot stuff going down my belly and smell plenty sulphur. This did not last too long, only two or three minutes, then I try to get up, but two people both dead lie across me, and after a struggle enough I get on my feet, I then know I was burned, I think I was burned when lying on the floor. I now open a window a little to get air, this revived me a little, but stones still dropped and more ashes come in, I shut it again. I watched the great black cloud for about two minutes while the window was open, it was full of fire like lightning, and I see stones drop on the ground break in pieces and glow hot. At this time many people in the shop done dead, and some of the houses outside were burning. Stones now ceased to drop, and there was a calm—this would be about 4 o'clock, and it was still dark. We now open the windows and doors and sit up till day clean, then I walked to the hospital at Georgetown. I know of six people being alive in the shop next morning, they were all burned. I think about eighty people die in the shop, most after we fall, but some during the night."

This man was very severely burned about the face and neck, also on the wrists and legs.

Further evidence showed that every person who left shelter during the wave of hot ashes was killed in a few minutes, that inhaling the ashes, &c., caused a feeling as if the windpipe was being compressed, and that this feeling was less acute while the sufferers held in their breath.

The burns seem to have been entirely caused by the hot dust falling on exposed parts at a temperature high enough to cause

vesication and destruction of the skin, but not at a sufficiently high enough temperature to ignite the clothing or the thatched roofs of the houses. Many houses were burned, but they seem to have been ignited by the "firestones." None of the burns presented the appearances characteristic of those inflicted by lightning, and the depth of tissues destroyed was greater than that usually found in burns by steam.

The large number of deaths caused by the eruption appear to have been almost entirely due to asphyxia by the hot ashes and heated air, the latter being probably somewhat deficient of oxygen. The cloud of dust was highly charged with electricity, and it is likely that some of the deaths outside the houses were caused by lightning, also that a few, especially children, may have been killed by the falling stones.

The question of the presence of noxious gases has also to be taken into account. It is certain that with the hot dust there was some sulphur dioxide, and it is probable that there was also a little hydrochloric acid gas, but had these gases been present in large quantities, the survivors would have suffered severely from irritation of the respiratory mucous membrane. Except in one or two of the elderly patients there were no signs of trachea or bronchial irritation.

There is no evidence of the presence of more lethal gases, such as carburetted hydrogen, carbon monoxide, or carbon dioxide; had these gases been the cause of death, it is impossible to conceive how anyone could have survived; moreover, death would have been more sudden.

On June 15 I visited the villages on the windward side, in which so many people were killed and injured. The country looked utterly desolate; dust, sand and small stones covered it to the depth of $1\frac{1}{2}$ ft., and in the ravines these materials existed many feet deep, obliterating the old watercourses. Heavy rains had fallen, and the water had formed new channels, in many places excavating enormous chasms.

In all the houses there was a very large quantity of exquisitely fine dust which had penetrated through the thatch and through the minutest crevice, *e.g.*, in the manager's house at Langley Park Estate, a house with close fitting doors and windows, this fine dust lay on the floors to a depth of three inches and adhered to the plaster on the walls to the thickness of three-eighths of an inch.

In this house there were thirty-one people, twenty-eight of whom died during the fatal afternoon and night of May 7.

The last of the Military Hospital marquees was struck on June 18, and with the detachment Royal Army Medical Corps I left St. Vincent on the 20th.

The conduct of the men of the detachment was excellent throughout, and the careful manner in which they carried out their duties, which were very arduous, and at first somewhat trying, was most praiseworthy, and deserves recognition.

Much of the success attained was due to the good work done by Dr. Durant and Nurse Paterson of the local medical service, who were first on the scene of disaster ; also to that done by Drs. Hutson, Bowen, and Offord.



Editorial.

THE ENTERIC FEVER PROBLEM.

THE prominent place which this disease holds, both in the daily thoughts and duties of every officer in our corps, is sufficient reason to justify an early review of present-day conceptions regarding its nature and etiology, in the pages of our Journal.

One of the most striking features of modern literature upon enteric fever is the development of the idea that many of the cases which are clinically diagnosed to be enterica and presumably caused by infection due to the bacillus of Eberth and Gaffky, are really instances of infection by the colon bacillus or possibly by both it and the *Bacillus typhosus*. Certain cases reported by Burch, in the *Medical Journal of New York*, May 31, 1902, to some extent bear out this view. His patients all suffered from continued fever, preceded by malaise and invariably accompanied by some gastrointestinal disturbance; the tongue was dry and foul, the abdomen usually distended, with gurgling and pain in the iliac fossa. Headache and mild delirium were not unusual. Examinations of the blood showed a diminution of leucocytes, while the urine swarmed with *Bacilli coli communis*. With the Grüber-Widal reaction, the patient's serum failed to specifically affect the *Bacillus typhosus*, though it did agglutinate the urinary bacilli. None of the cases apparently terminated fatally. Many medical officers in the Army are familiar with cases of this kind. Clinically and pathologically they are indistinguishable from classical enterica, but bacteriologically they are not, as the sera are specific only to colon bacilli, while from the spleen and blood only these micro-organisms are recoverable. It is difficult to see why these cases should not be regarded as instances of a pure infection by the colon bacillus, for it is exceedingly improbable that all of them should fail to react to the enteric bacillus if in reality they were cases of typhoid fever.

Similar in nature and equally interesting are other cases, which have been recorded in recent medical literature, and in which the infecting agent would seem to have been organisms intermediate between the enteric and colon bacilli, and which are variously termed para-typhoid or para-colon, according to whether they conform culturally more to one or other type. There can be little

doubt that in the detection, noting and bacteriologically observing of cases of this kind, especially in India and South Africa, there is a large and promising field of work for army medical officers. The line of enquiry should embrace not only exact identification of micro-organisms recoverable immediately after death, but serum reactions of the patient against typical enteric bacilli, typical colon bacilli and atypical varieties of both. At the same time, when the circumstances permit, the search should be made for bacilli in the blood, and precise identification established of any bacteria found. Some important work in this direction has been done by Cole (*Bulletin of Johns Hopkins Hospital*, July, 1901), and by Schottmueller (*Münch. Med. Wochenschrift*, September 23, 1902), who both find the diagnostic and prognostic uses of bacteriological blood examinations more valuable than the Grüber-Widal test, since the former is able to allow of definite conclusions being formed long before the latter. As compared with a bacteriological examination of the fæces or of the spots, the blood method has advantages. The technique for direct blood examinations is briefly as follows: The front of the arm must be carefully washed with soap and water, then with ether, and lastly with bichloride of mercury solution, 1 in 1,000. The bichloride is next carefully removed by means of sterile swabs of wool soaked in sterile water and 10 cc. of blood removed by inserting the sterile needle of a sterile syringe into a superficial vein. The contents of the syringe are quickly passed into agar which has been made fluid and cooled to 45° C., the whole well mixed and plated. About 2 cc. of blood should be added to each tube containing from 6 to 10 cc. of agar. Besides the two observers named above, Courmont and Busquet speak well of this method and, provided elementary care as to antisepsis be observed, it should present no risks to the patient incommensurate with its real diagnostic value.

As to the nature of enteric fever, we are indebted to Wasdin (*American Medicine*, February 8, 1902) for the original and interesting suggestion that the majority of cases of the disease are probably pneumonic in origin, the primary spot of infection being somewhere in the respiratory tract, whence the germ invades the general circulation. In support of this view he claims to have readily located, upon the first examination, an area of lung corresponding to such infection. Wasdin says many of these cases might be overlooked as being merely simple bronchitis, but the condition

is unilateral and the sputum contains bacteria indistinguishable from *B. typhosus* and accompanied by pneumococci. These arguments are supplemented by references to the admitted frequency of bronchitis in early enteric fever, the undoubted occurrence of the disease without bowel lesions, and the descriptions of pneumo-typhoid of French authors. A very strong argument in favour of this view is the fact that the enteric bacillus can be obtained from the blood quite early in the fever, while it is extremely difficult to isolate it from the stools much before the second week. Such a theory necessarily implies a modification of existing ideas as to the nature, treatment, etiology and prophylaxis of the disease. In place of regarding the resulting toxæmia as following lesions of the bowel, we must regard these latter rather as manifestations of the action of diffusible toxins, and that the presence of specific bacilli in the intestine depends more upon the existence of lesions, rather than that the lesions are due to the presence of the bacilli therein. Wasdin's views regarding treatment are naturally in the direction of attaining germicidal effects at the point of primary infection; for this he recommends benzyl-acetyl peroxide used in a 1 in 33,000 solution by the mouth or in 5-grain powders. This drug is not toxic and in his hands is said to have given good results. As regards etiology and prophylaxis, dust constitutes a greater danger than water. We need more evidence from the clinical and bacteriological side before Wasdin's thesis can be accepted, but one must confess there is much which is highly suggestive in his paper and, in the light of recent work at Netley, much which is probable; in any case an attack upon the orthodox view that enteric fever is a mere specific enteritis is to be cordially welcomed.

Approaching the question of the etiology of enterica from a somewhat different standpoint, we, in conjunction with Horrocks, have thrown some light upon the possible influence of soil, flies and fabrics, in the dissemination of the enteric infection. Although this ground had been covered by former workers, it was felt that in view of the strong circumstantial evidence coming from India and South Africa in support of the idea that these infected media were efficient sources of infection, it was worth reopening, more especially as much of the earlier research had been carried out at a time when a fuller knowledge of the enteric bacillus, and improved techniques for its detection were wanting. The work necessarily involved a precise determination of the viability of

the enteric micro-organism in and on these media. The details of the inquiry are fully given in the *British Medical Journal* of September 27, 1902, and the conclusions arrived at were briefly as follows : (1) That there is no evidence that the enteric bacillus in soil could increase or grow in different directions ; (2) that the enteric bacillus is capable of being washed through at least 18 inches of closely packed soil by means of water ; (3) that the bacillus survives in moist soil for varying periods, sometimes as long as seventy-four days ; (4) that this survival of the organism in soil is independent of either pollution or the reverse ; (5) that its survival is mainly dependent upon the amount of moisture present ; (6) that the bacillus is recoverable from fine dry sand after twenty-four days, but if the sand is kept moist the bacillus is not recoverable after twelve days, probably from being washed down into the deeper layers ; (7) that the bacillus rapidly dies out in peat ; (8) that from ordinary soil kept damp with rain-water the bacillus could be recovered on the sixty-seventh day, with dilute raw sewage on the fifty-fourth day, with dilute sterile sewage on the seventy-fourth day, and that in similar soil the bacillus disappeared at once from the surface layers after heavy rainfall ; (9) that infective material could be readily carried from dried soil and sand by air currents ; (10) that the bacillus is recoverable from air-dried fabrics, such as khaki drill or serge, after periods varying from seventy-four to eighty-four days ; (11) that infected dry soil, if blown about as dust, is capable of infecting distant objects after twenty-four days from time of desiccation ; (12) that ordinary house flies can convey infective matter from excreta or other polluted material to objects on which they may walk, rest, or feed, and that such infective matter appears to be attached to their heads, legs, bodies and wings, but there is no evidence to show that the enteric bacillus passes through their digestive tract.

It is obvious that these facts, and the conclusions to be drawn from them, have an important bearing upon many practical sanitary questions, especially those of military life. It is true some of the facts are not in accordance with results obtained by Martin in some similar investigations made for the Local Government Board, but it is legitimate to think that any failures to find the enteric bacillus in definitely polluted soil during lengthy periods must be attributed to faulty methods. It is not unlikely that, with an improved technique, the enteric bacillus may be recovered from

soil after even longer intervals than already stated; in fact, a paper by Pfuhl (*Zeitschrift f. Hygiene*, Bd. xl., Hft. 3), of Berlin, shows that he, independently working on the same lines, has obtained very similar results. In some instances he found the period of survival in soil to be even longer. A later communication on the same subject by Levy and Kayser (*Centralb. f. Bakter.*, March 20, 1903) shows that enteric bacilli can be recovered from typhoid excreta after they have been buried in a closed vessel in clay soil for over five months.

The more important lessons which these facts teach are : (1) The need of the greatest personal cleanliness on the part of soldiers ; (2) the need of scrupulous care in the disposal of excreta, especially by methods of dry conservancy, and the attainment of sterility if not complete destruction of excreta by fire ; (3) the necessity of detecting early and ambulant cases of enteric fever ; and (4) the risks attending overcrowding in tents and the want of proper facilities for protecting food supplies from flies, and for meals being taken in places other than those used for the common life of soldiers. The first and third do not call for special comment so much as do the second and fourth. A reference to our paper *in extenso* will demonstrate the grave dangers which must follow in the light of the facts which we have observed, from the reckless or careless distributing of excreta upon or in soil. These dangers are particularly manifest in dry or arid countries where the fixing as it were of the dangerous elements of dejecta in the soil are always difficult to secure. It is obvious that the present custom of burying excreta superficially in the vicinity of cantonments in India is fraught with the gravest dangers. One quite realises that, however desirable some form of water-carriage system may be, the present principle of dry-earth latrines in barracks cannot be abandoned all at once, but one fails to see why the ultimate disposal of these latrine contents should be allowed to be continued in the casual, haphazard and unscientific way which now prevails in so many places. Instead of farming out this latrine compote to any zamindar who is prepared to take it, without any regard as to the suitability of his land for its reception, either in respect of agricultural utility or proximity to barracks, we must urge that the disposal of this material should be conducted on more serious lines, the dominant principles of which should be : (1) No spot to be permitted for these uses which lies on the side of

the cantonment from which the prevailing wind blows ; (2) no land to be used for these purposes which does not permit of frequent irrigation and cultivation ; (3) all land required for excretal disposal should be compulsorily acquired by the State, and if no water is available on such land for irrigation, it should be incumbent on the State to provide it either by sinking wells or other means ; (4) all land used for excretal burial should be put under cultivation at as frequent intervals as is possible ; (5) all these sewage farm lands should be absolutely controlled and administered by the State. Anyone conversant with the circumstances and needs of India, will realise at once that the adoption of these principles would obviate many of the hideous mistakes which have been committed in the past, and which still constitute a notorious blot upon Indian sanitation. It is to be hoped that in organising and developing our new cantonments in Africa we shall avoid the mistakes made as to this matter in their prototypes of Asia. The ideal arrangement, of course, for coping with the dangers from this cause would be destruction by fire, but at present we see no prospect of excretal cremation on any large scale being practicable.

As regards the risks attending overcrowding in tents and the evils resulting from food pollution by means of dust and flies, a most valuable mass of evidence has been published by the United States Government, in the form of an "Abstract of Report on the Typhoid Fever Epidemics in the Volunteer Camps of the United States Army in 1898." Many of the conclusions formed by the Commission who drew up the report are of great suggestiveness and importance. They found that, in the majority of cases, infected water was not an important factor in the spread of the enteric fever, but that there was much to indicate the necessity of extraordinary measures for the prevention of direct infection from man to man, and of infection through soil, or from the clothing, bedding and tentage of the troops. Attention has been called before now to the possibilities of direct infection with enteric fever when men of the most susceptible age are crowded together in tents for weeks together, and of indirect infection through the clothing, bedding, &c., or through the soil round about the tents after it has been freely contaminated with organic matter and specifically infected by the urine or other excreta of men who have contracted the disease. But never have the facts been so clearly shown as in

these American investigations of what they call "company epidemics," and certainly never has it been so definitely demonstrated that when the infection has been introduced into a camp it will continue to spread from one man to another in the tents, and from one tent to another. The whole report is full of interest, but needs to be studied in the original for full appreciation not only of its thoroughness but of its evident exactness. It is a striking confirmation from real service life of recent laboratory work.

Although great stress has been laid in this article upon the dangers and possibilities of infection by means of soil, dust and personal contact, it must not be overlooked that there are other means of disseminating the enteric infection, notably by water. The experiences of our own and other armies in the past only too clearly indicate the need of constant vigilance over water supplies, to both safeguard them from primary pollution and also purify them, if suspected of pollution, before issue to the consumer. Whether it be under the circumstances of peace or war, of cantonment, camp or moving columns, this question of securing a pure or clean water for the soldier is a matter of organisation. Our readers will doubtless ask the question whether recent experiences in South Africa have been taken to heart, and whether, on the next occasion when our Army takes the field, it will be in any better condition of organisation and preparedness to supply its wants with reasonably clean water. We are afraid that only time will answer these very legitimate questions, but for our own part, we have no hesitation in saying that the solution of this important and difficult problem can only be by thorough organisation of a sanitary service in times of peace to meet the needs of war. The organisation must be of no mere academic kind, it must be thorough, embracing both water purification and efficient conservancy; moreover, it must be such that a direct strain of responsibility rests upon someone, carrying with it *kudos* and reward for successful avoidance of preventable disease as well as reprobation for failure. It rests largely with ourselves to say who is best fitted to undertake this duty; but where we admit competency, there must we locate executive functions.

Current Literature.

I.—MEDICINE AND SURGERY.

Cholelithiasis and Pancreatitis.—J. Wiener (*New York Medical Journal*, May 16, 1903) discusses the relation of cholelithiasis to pancreatitis. The close anatomical relation between the bile and pancreatic ducts indicate a near pathological connection. A calculus which obstructs the former near the papilla of Vater must also obstruct the latter. If the pancreatic secretion is obstructed microbes may migrate from the duodenum and set up pancreatitis, and further, the obstruction of the flow causes back-pressure on the parenchyma of the gland, and is therefore, *per se*, injurious. Opie has collected thirty-two cases in which pancreatic lesions and fat necrosis were found associated with cholelithiasis. In one case a calculus had entered the pancreatic duct and caused suppuration. Wiener relates the case of a woman, aged 41, the mother of three children, who was suddenly seized with violent pain in the upper abdomen on January 28. On January 30 the pain had increased and become colicky. The whole abdomen was tender and the right rectus rigid. In the evening the face was pale and anxious, the pulse was 120, irregular and compressible, and the temperature was 102.5°. The epigastrium and right hypochondrium were tender, while the right rectus was rigid at the level of the umbilicus. In the right flank was dullness, which was replaced by tympany on turning the patient on the opposite side. An incision was made along the outer border of the right rectus at the level of the umbilicus. When the peritoneum was opened clear fluid escaped. The omentum was studded with opaque yellowish-white patches, which were proved, by removal of a piece and examination, to be areas of fat necrosis. The head of the pancreas felt hard.

The Arrest of Hæmorrhage after Tonsillotomy.—This subject is discussed by Otto Burkard (*Wien. klin. Woch.*, May 28, 1903). In the few cases in which direct pressure on the bleeding surface has failed, the following procedures have been employed: (1) If the bleeding vessel is visible it may be ligatured or the hæmorrhage arrested by torsion. But the vessel is seldom visible. (2) Paquelin's cautery may be applied. This is an uncertain and unsatisfactory method. (3) The external carotid artery may be ligatured. This procedure was advocated by O. Zuckerkandl, who maintained that it was impossible to wound the internal carotid artery with ordinary care. But in many cases ligature of the external carotid would be insufficient. The tonsillar artery usually arises from the ascending palatine; but not infrequently it arises directly (or indirectly as a branch of an abnormal ascending palatine) from the ascending pharyngeal artery, which may be given off at the bifurcation of the common carotid or even from the internal carotid. Further, the normal free anastomosis at the base of the skull renders secondary hæmorrhage probable. The tonsillar artery anastomoses not only with the ascending pharyngeal but also with the branches of the ascending palatine to the soft palate of the same side and with the palatine arteries of the other side. (4) The internal carotid artery

may be ligatured. This is unjustifiable, as being in itself dangerous, and not necessarily successful. In one case in which it was performed there was renewed hæmorrhage, probably from the palatine vessels of the opposite side. Doubt has been thrown on the tonsillar artery as the invariable source of profuse hæmorrhage after tonsillotomy, and it seems certain that in cases in which it has occurred immediately after the operation a larger vessel has been wounded. Merkel has shown that a loop of the facial, and Demme that a loop of the lingual, may occasionally reach as high as or even be imbedded in the substance of the tonsil. (5) The most rational method, both in immediate profuse and obstinate recurrence of slighter hæmorrhage, appears to be that proposed by Nicoladoni, viz., to cut down and remove the tonsillar stump from without and to close the pharyngeal wound by approximating the anterior and posterior pillars of the fauces by sutures. An incision is made beginning just below and behind the insertion of the pinna, and curving downwards behind the ascending ramus of the jaw to a finger's breadth above the great cornu of the hyoid bone. The platysma and cervical fascia are divided close to the angle of the jaw and the stylohyoid and digastric muscles exposed. The jaw is forcibly retracted upwards. The tonsil is found by forcing it upwards by a finger placed in the mouth. It lies under the stylohyoid and digastric muscles immediately in front of the pharyngeal insertion of the stylopharyngeus. The tonsillar artery is seen to pass almost at right angles to the digastric muscle from behind upwards and forwards to the tonsil. It is ligatured and divided. The large vessels lie behind the field of operation. The styloglossus must be retracted or divided. The tonsil is then completely removed, hæmorrhage arrested, and the wound closed.¹

Resection of Ribs and Disinfection of Cavities in Phthisis.—

C. Spengler (*Deutsche med. Woch.*, April 30 and May 7, 1903) treats all cases of phthisis in which there are cavities and copious purulent sputum with inhalations of formalin. Ten drops of a mixture consisting of formalin 5 cc., absolute alcohol 20 cc., and ether 75 cc., are placed in a tumbler and inhaled through the widely-opened mouth. The glass is moved aside during each expiration to avoid the condensation of aqueous vapour. About ten deep inspirations suffice for each inhalation. The process is repeated every other night for a fortnight, abandoned for a few days, and then resumed. The sputum should be examined every week during the treatment. At first the sputum and the severity of the cough are increased, but soon the sputum and the number of tubercle bacilli begin to diminish. Exceptionally the number of bacilli may increase, but this is no indication for an increase in the dose of formalin. Large inhalations, such as 40 minims of the mixture frequently repeated, may cause the number of tubercle bacilli to increase, probably by coagulating the leucocytes and paralysing phagocytosis. Great caution is required if laryngitis or nephritis are present.

If inhalations fail, and there is not too great debility, surgery offers the one chance of cure. Portions of several ribs should be removed to allow the pleural cavity to contract and the thick-walled pulmonary cavities to collapse. The ribs should invariably be divided posteriorly as near the vertebræ as possible, that is, between the tuberosity and the angle; anteriorly the site of division depends on the amount of rib to be removed. If the

rule of dividing the rib far back is followed the resulting scoliosis is almost imperceptible. The total length of ribs which should be removed depends on the size of the cavities, which can be roughly estimated by the quantity of sputum expectorated in twenty-four hours. It is seldom less than 10 in., and may exceed 12 in. If the case is complicated by empyema, a curved incision should be made with its lowest point over the tenth rib and the bottom of the pleural cavity in the posterior axillary line. If the cavities are small the removal of portions of the ninth and tenth ribs may suffice, but if they are larger, portions of the ninth, eighth, and possibly the seventh, may require removal. The pleura is incised as low as possible and a drainage tube inserted. If there is no empyema the best place to resect the ribs is under the scapula, and the operation should be entirely extra-pleural. The periosteum is peeled off and the ribs are removed without opening the pleural cavity. The incision begins between the nipple and anterior axillary line at the level of the fifth or sixth ribs, curves downwards round the angle of the scapula and ascends into the interscapular space. The scapula is freed from the thorax and raised with the arm. Portions of the third, fourth, fifth, sixth and seventh ribs may be removed through this incision. The writer has performed the operation ("thoracoplasty") in eight cases. In all these were extensive lesions and both lungs were involved. One patient, a woman, recovered, and her sputum has been free from bacilli since 1892; another was benefited, but eventually succumbed; the rest have died since the operation. But if one patient in eight in advanced phthisis can be saved the operation is worthy of trial. Ether is preferable to chloroform for thoracoplasty. Direct incision and drainage of tuberculous cavities is irrational. A large cavity is always drained through the bronchi. Healing is prevented not by bad drainage, but by the rigidity of the walls.

II.—HYGIENE AND PATHOLOGY:

The Purification of Drinking Water in the Field.—In² a very comprehensive review of the various suggestions which have been made for water purification, Vaillard (*Archives de Médecine et de Pharmacie militaires*, No. 7, 1902) advocates an iodine method, which in his hands has yielded good results, when employed in a proportion of 6 centigrammes per litre of water. To obtain the iodine in a free state, he decomposes iodate of sodium with tartaric acid and then dissolves it in an excess of iodide of potash. To make the method of practical application, the various reagents are compressed into differently coloured tabloids in accordance with the following formulæ:—

No. 1. Blue tabloids	{	Iodide of potassium	..	..	10 grammes.
		Iodate of sodium	..	..	1.56 "
		Methylene blue, a sufficiency.			

Divide into 100 tabloids, each weighing 0.1156 gramme.

No. 2. Red tabloids	{	Tartaric acid	..	..	10 grammes.
		Fuchsin, a sufficiency.			

Divide into 100 tabloids, each weighing 0.1 gramme.

The simultaneous solution of a red and blue tabloid in a litre of water sets free 0.06 gramme of iodine, leaving 0.0346 gramme of iodide of potassium and small quantities of tartrates of potash and soda in solution. When

the liberated iodine has acted for ten minutes one neutralises it by adding and dissolving in the water a third tabloid, white in colour and containing 0.116 gramme of hyposulphite of soda. All this free iodine is at once combined with the soda into iodide of sodium. The water is now found to have a normal appearance, and to be free from any taste or smell.

This chemical purification, or rather sterilisation, of the water can be carried out in any metal vessel without detriment. In the case of waters heavily laden with suspended matters a preliminary clarification is desirable. This method is similar in its chemistry to Schumburg's bromine procedure. We have not had any opportunity of testing its efficiency, but according to Vaillard, sterilisation of water is secured in ten minutes. It appears highly desirable that this and some other well-known methods of water sterilisation by chemical means should be seriously and systematically tried by large bodies of troops under conditions of field service.

The Diagnostic Value of Blood Counts in Tropical Fevers.—In a paper read before the Royal Medical and Chirurgical Society, Captain L. Rogers, I.M.S., discusses (*Lancet*, May 16, 1903, p. 1371) whether there are any hitherto undifferentiated fevers to be met with in India which had not previously been tested by modern methods of diagnosis, notably by serum tests and differential leucocyte counts. To this latter procedure the author attaches great value in differentiating enteric from malarial fevers, as in most of these paludal affections considerable difficulties exist in finding the essential parasites. In Rogers' experience there is a very frequent presence in enterica of an increase in the percentage of lymphocytes without any increase of the large mononuclear white corpuscles; whereas in malarial remittent fevers there is a marked large mononuclear leucocyte increase. The positive frequency of enteric fever in natives, as shown by serum reactions, was emphasised, and the question of the existence of new or hitherto unrecognised fevers in addition to enterica and malaria was decided in the negative.

The author certainly displays great ingenuity in the argument of his paper, but it is difficult to assent, without further evidence, to his conclusions that enteric fever can be diagnosed by an excess of lymphocytes, and malaria by an excess of large mononuclear leucocytes. Other tropical fevers certainly show the latter excess, notably some of the little understood fevers which are very prevalent in India, where the facts on which this paper is based were largely obtained.

The Etiology of Sleeping Sickness.—A further note upon the result of their researches has been issued by the members of the Portuguese Commission sent out to investigate the disease in Africa (*Lancet*, May 23, 1903, p. 1438). These workers report that out of nine cases in which they drew off cerebrospinal fluid during life, a special diplo-streptococcus was isolated in six instances; while on thirteen occasions they obtained the same micro-organism from the subarachnoid exudate on making *post-mortem* examinations. To this microbe they suggest the name hypnococcus, and from the descriptions given of its cultural characters it would seem to be an intermediate form between the *Streptococcus pyogenes* and the *Streptococcus lanceolatus* or *diplococcus* of Fraenkel. Castellani, a member

of an English Commission sent out to inquire into sleeping sickness (*Lancet*, March 14, 1903, p. 723), described a very similar organism as being present in the cerebrospinal fluid of patients during life and after death. After allowing for errors in translation of the Report of the Portuguese Commission, there appears every reason to believe that both sets of observers are dealing with the same micro-organism. The group to which this diplococcus belongs is notoriously difficult to study, mainly owing to the indefiniteness of its morphological and cultural features. The situation, however, is by no means simple, for Castellani, in a later communication to the Royal Society, reports that in 80 per cent. of sleeping sickness cases a trypanosome is to be found in the cerebrospinal fluid. The constant presence of this flagellate in these cases is confirmed by our brother officer, Lieut.-Col. Bruce, now in Uganda investigating the same disease. He reports that in thirty-eight cases he had found trypanosoma in every case in fluid obtained by lumbar puncture, and that he had found the same organism in the blood in twelve out of thirteen cases of sleeping sickness. Castellani puts forward as a working hypothesis on which to base further investigations that sleeping sickness is due to the species of trypanosoma found in the cerebrospinal fluid of these cases, and that at last in the least stages there is a concomitant streptococcal infection which plays a certain part in the course of this disease.

Corps News.

EXTRACTS FROM LONDON GAZETTES.

ROYAL ARMY MEDICAL CORPS.

Major F. S. Heuston, C.M.G., is seconded whilst holding the position of Physician and Surgeon to the Royal Hospital, Kilmainham, dated October 1, 1902.

Lieutenant-Colonel A. W. P. Inman, from the Seconded List, to be Lieutenant-Colonel, dated October 1, 1902.

Lieutenant-Colonel J. A. Gormley, M.D., is placed on retired pay, dated June 3, 1903.

Lieutenant-Colonel T. A. Dixon, M.D., retires on retired pay, dated June 13, 1903.

ARMY MEDICAL RESERVE OF OFFICERS.

Surgeon-Lieutenant-Colonel G. R. T. Phillips, having resigned his appointment in the Imperial Yeomanry, ceases to be an officer in the Army Medical Reserve of Officers.

Surgeon-Lieutenant E. Downes, M.D., F.R.C.S.E., having resigned his appointment in the Volunteers, ceases to be an officer in the Army Medical Reserve of Officers.

IMPERIAL YEOMANRY.

Lovat's Scouts.—The undermentioned Gentlemen to be Surgeon-Lieutenants :—

John Beach, M.B., dated June 10, 1903.

John Robert Kennedy, M.B., dated June 10, 1903.

Staffordshire (Queen's Own Royal Engineers).—Surgeon-Captain E. W. Welchman, to be Surgeon-Major, dated June 6, 1903.

VOLUNTEER CORPS.

4th West Riding of Yorkshire.—Surgeon-Lieutenant A. W. Cuff, M.B., to be Surgeon-Captain, dated May 9, 1903.

1st Volunteer Battalion the Royal Warwickshire Regiment.—Surgeon-Captain R. A. Newton to be Surgeon-Major, dated June 6, 1903.

4th Volunteer Battalion the South Wales Borderers.—William Percival Miles, Gent., to be Surgeon-Lieutenant, dated June 6, 1903.

3rd Volunteer Battalion the Gloucestershire Regiment.—Surgeon-Lieutenant T. M. Carter resigns his Commission and is appointed Lieutenant, dated June 6, 1903.

3rd Volunteer Battalion the Duke of Wellington's (West Riding Regiment).—Surgeon-Lieutenant A. Waugh, M.B., resigns his Commission, dated June 6, 1903.

1st Volunteer Battalion the Sherwood Foresters.—Surgeon-Lieutenant E. V. Eames to be Surgeon-Captain, dated June 6, 1903.

1st Volunteer Battalion the Loyal North Lancashire Regiment.—Surgeon-Lieutenant J. Lea, M.B., resigns his Commission, dated June 6, 1903.

2nd Hampshire.—John Henry Frederick Way, Esq., late Captain, to be Surgeon-Lieutenant, dated June 13, 1903.

Royal Garrison Artillery 1st Cinque Ports.—John Reginald Long to be Surgeon-Lieutenant, dated June 13, 1903.

Royal Engineers, Submarine Miners (The Tay).—John Yule Mackay, M.D., to be Surgeon-Lieutenant, dated June 13, 1903.

2nd Volunteer Battalion the Royal Warwickshire Regiment.—Surgeon-Lieutenant J. Orton to be Surgeon-Captain, dated June 13, 1903.

4th Volunteer Battalion the Cameronians.—Surgeon-Lieutenant A. J. Wilson-Gunn to be Surgeon-Captain, dated June 13, 1903.

22nd Middlesex.—Surgeon-Captain W. J. Harnett resigns his Commission, and is granted the honorary rank of Surgeon-Major, with permission to wear the uniform of the Corps on retirement, dated June 13, 1903.

1st Cadet Battalion the King's Royal Rifle Corps.—Surgeon-Lieutenant R. Roche to be Surgeon-Captain, dated June 13, 1903.

1st (Hallamshire) Volunteer Battalion the York and Lancaster Regiment.—Surgeon-Major J. W. Martin, M.D., to be Surgeon-Lieutenant-Colonel, dated June 13, 1903.

2nd Volunteer Battalion Gordon Highlanders.—The undermentioned officer resigns his Commission :—

Surgeon-Lieutenant H. G. Cowie, M.D., dated June 13, 1903.

Royal Army Medical Corps (Volunteers) the Manchester Companies.—Lieutenant W. L. Bentley to be Captain, dated June 13, 1903.

Volunteer Infantry Brigade Bearer Company.—*Welsh:* Lieutenant A. W. Sheen, M.D., to be Captain, dated June 13, 1903.

EXAMINATION FOR PROMOTION.—The following Officers have passed in "Army Medical Organisation," "Sanitation and Epidemiology," and the "Special Subject" for promotion to Lieutenant-Colonel:—

Majors N. C. Ferguson, C.M.G.; M. T. Yarr; J. S. Edye; T. Du B. Whaithe; G. E. Hale, D.S.O.; C. E. Faunce; N. Manders; E. A. Burnside; W. T. Swan; F. A. Saw; G. E. Moffet; J. J. C. Watson, C.I.E.; R. H. Firth; J. Meek; M. O'D. Braddell; J. B. Wilson; R. J. C. Cottell; E. Davis; J. R. Forrest; R. L. L. MacLeod; J. P. Donegan; T. G. Lavie; J. Riordan; W. B. Day; F. S. Heuston; E. C. Freeman; C. R. Kilkelly, C.M.G.

The following Officers have passed in Military Law:—

Majors F. J. Greig; N. C. Ferguson, C.M.G.; M. T. Yarr; J. S. Edye; T. du B. Whaithe; G. E. Hale, D.S.O.; C. E. Faunce; N. Manders; G. Cree; E. A. Burnside; T. W. Swan; E. C. Freeman; G. E. Moffet; J. J. C. Watson, C.I.E.; J. Meek; M. O'D. Braddell; J. B. Wilson; E. Davis; R. L. L. MacLeod; T. G. Lavie; J. Riordan; W. B. Day.

POSTINGS.—The following Officers have been posted to the Districts named:—

Lieut.-Colonel G. A. Hughes, Dublin.
Lieut.-Colonel B. T. McCreery, Ireland.
Lieut.-Colonel A. S. Rose, Scotland.
Lieut.-Colonel F. J. Jencken, Aldershot.
Major R. Holyoake, Eastern.
Major A. Wright, Southern.
Major W. H. Starr, South Eastern.
Captain H. A. L. Howell, Thames.
Captain J. P. Silver, Western.
Captain F. J. C. Heffernan, North Eastern.

CHANGE OF STATION.—The following changes of Station have taken place:—

Lieut.-Colonel J. H. R. A. Rhodes, from Lichfield to Birmingham.
Major G. Bent, from Birmingham to Warrington.
Major S. J. W. Hayman, from Dublin to Dundalk.
Captain D. E. Curme, from Devonport to Penally.
Captain F. R. Buswell, from Portsmouth to Parkhurst.
Captain C. R. Morgan, from Edinburgh to Aberdeen.
Lieut.-Colonel J. Armstrong has arrived home from South Africa.

LEAVE FROM ABROAD.—The following Officers have arrived home on leave: Surgeon-General J. A. Clery, C.B., Colonel W. J. Charlton, Lieut.-Colonel A. V. Lane, Lieut.-Colonel W. J. MacNamara, Major J. M. Reid, Major R. I. Power, Captain F. S. Walker, Captain A. L. A. Webb, Lieut. R. A. Bostock.

QUALIFICATIONS.—The undermentioned Lieutenants obtained the "M.B." London in May, 1903: A. B. Smallman, W. F. Tyndale, C.M.G., G. W. Smith, F. N. W. Dawson; and the following the "M.R.C.P." London: Lieut. A. H. Hayes.

ROYAL ARMY MEDICAL COLLEGE.—The First Class of Instruction before Examination for Promotion to Major at the Royal Army Medical College consists of: Captains F. M. Mangin, C. E. Pollock, W. J. Taylor, B. W. Longhurst, C. T. Samman, C. E. P. Fowler, A. E. C. Keble, St. J. B. Killery, H. C. French, E. M. Williams, J. R. McMunn, H. V. Prynne, K. B. Bennett, M. Boyle, H. A. Berryman, C. M. Fleury, A. C. Fox, S. F. St. D. Green, W. Tibbits, G. St. C. Thom, C. W. Profeit, F. Kiddle, A. F. Heaton, J. Grech, R. M. Le H. Cooper, A. W. Hooper, D.S.O.

The course of six months' duration terminates at the end of July. A new class is to be formed in August.

The following Officers on leave, &c., are voluntarily undergoing a course of Hygiene and Bacteriology at the Royal Army Medical College: Major A. P. Blenkinsop, Major R. J. Copeland, Major J. Meek, Major C. Dalton; Captain

J. E. Carter, H.P., Captain N. J. C. Rutherford, Lieut. H. E. Weston, Lieut. J. H. Brunskill, Royal Army Medical Corps; Surg.-Captain Purdy, New Zealand Mounted Rifles.

MEMORIAL TO THE LATE SURGEON-GENERAL NASH, A.M.S.—The following subscriptions have been received to this Fund, which is now closed:—

Captain McDermott	£0	10	6
Major A. P. Blenkinsop	1	1	0
Major C. J. Holmes	1	1	0
Major F. J. Morgan	0	5	0
Surgeon-General Sir W. R. Hooper, K.C.S.I. I.M.S. (Rtd.)	1	1	0
Previously acknowledged in the <i>Lancet</i> and <i>British Medical Journal</i>	114	1	0
	<hr/>		
	£117	19	6

(Signed) B. SKINNER, Lieut.-Col.,

Hon. Sec.

June 9, 1903.

THE ALBERT MEDAL.—The King has been graciously pleased to confer the decoration of the Albert Medal of the Second Class upon Captain Herbert C. French, Royal Army Medical Corps.

The following is an account of the services in respect of which the decoration has been conferred:—

"While His Majesty's transport 'Wakool' was steaming at the rate of about twelve knots an hour through the Straits of Malacca, on November 17, 1902, a native fireman jumped overboard. Captain French, who was a passenger on board, immediately dived off the promenade deck, a height of about 36 feet from the water, and swam to the place where he had observed the man. Before he reached the spot the man had disappeared, and Captain French was obliged to make for a lifebuoy as he was exhausted with the weight of his clothing. Subsequently both were rescued by the ship's lifeboat. Captain French incurred considerable risk, as a strong current was running at the time and he might have been drawn under the propellers of the ship. He was also in danger of sharks and water-snakes, which are known to frequent the Straits of Malacca."—(*London Gazette*, March 10, 1903.)

ENNO SANDER PRIZE.—We have great pleasure in announcing the fact that this prize of the Association of Military Surgeons of the United States Army has been awarded to Major Frederick Smith, D.S.O., of the Royal Army Medical Corps, for his Essay on "The Differential Diagnosis of Typhoid Fever in its Earliest Stages." We are sure that the news will be received with the greatest satisfaction by all ranks of the Corps, and that we are united in offering Major Smith our warmest congratulations. This award establishes another link in the already strong bond of friendship which has existed between ourselves and our colleagues in the Medical Service of the United States Army in the past, and which we are sure will continue to gain strength in the future.

FAREWELL DINNER TO LIEUT.-COL. RUTTLEDGE.—On Thursday, June 4, a farewell dinner was given in the Officers' Mess to Lieut.-Col. W. F. Rutledge (R.P.), on his retirement from his duties at Aldershot. Surgeon-General McNamara, C.B., C.M.G., Principal Medical Officer of the Aldershot District, in proposing the health of the guest of the evening, dwelt in eulogistic terms on those splendid services which for many years Lieut.-Col. Rutledge had rendered to the Mess, and of the consequent benefits which he had conferred on all officers of the Corps. The toast was drunk with musical honours.

Lieut.-Col. Rutledge, in his reply, gave a brief history of the Mess, and referred at some length to those N.C.O.'s whose help had been instrumental in making the institution a success. The dinner was in every sense a complete success, a fact which was largely due to the energy and organising powers of the Mess President, Lieut.-Col. Routh, R.A.M.C.

Lieut.-Col. Rutledge carries with him into his retirement the kindly and grateful feelings of his brother officers. He can fairly be called the father of the Aldershot Mess, for many years he has devoted himself unsparingly to its interests, and the debt of gratitude which we owe him will never be forgotten.

THE BAND, the existence of which we owe to the initiative of Lieut.-Col. Grier, is now thirty-two strong, and under the able leadership of the present Bandmaster, Mr. Bennett (late Royal Welsh Fusiliers), is in every respect a complete success. This result is also in great measure due to the zeal and interest shown by the Hon. Secretary, Captain H. A. Hingo, R.A.M.C. In addition to playing on Church and other parades, guest nights, &c., the band has many engagements to perform in public, and will play this month at the Aldershot Flower Show, and at the Annual Dinner on June 15. The men not being officially recognised as bandsmen, are called upon to perform the ordinary duties of the Corps, and this fact reflects additional credit on all those whose endeavours have contributed towards making the institution in question so eminently successful. The *esprit-de-corps* of Lieut.-Col. Grier has had its reward, and the band now exists as an example of what may be done by energy and perseverance in the face of great difficulties.

REGIMENTAL INSTITUTES.—A canteen which supplies a long-felt want has recently been built and opened in the Depot lines, Aldershot. A new Army Temperance Room has also been recently opened in the lines. The regimental institutes may now be said to be complete.

THE ANNUAL DINNER of the Corps was held at the Whitehall Rooms, Hôtel Métropole, on Monday, June 15.

The Director-General presided, and the number present was 174. This was a "record attendance"; but we should not be surprised if it were beaten next year, as the number of officers belonging to the Royal Army Medical Fund is constantly increasing, and the institution of the Dinner is becoming more widely known.

The Corps Band played during dinner, and we think that Mr. Bennett, the Bandmaster, is to be congratulated on the improvement that he has effected in spite of difficulties.

The following is a complete list of officers present:—

Brig.-Surg. J. Anderson, C.I.E.; Captain R. F. E. Austin; Col. A. Lang Browne; Lieut.-Col. W. Babbie, V.C., C.M.G.; Lieut.-Col. C. R. Bartlett; Lieut.-Col. J. D. Beckitt; Lieut.-Col. J. F. Beattie; Lieut.-Col. J. P. H. Boileau; Lieut.-Col. W. G. A. Bedford, C.M.G.; Major A. P. Blenkinsop; Major C. T. Blackwell; Major M. O. D. Braddell; Major C. H. Burtchaell; Captain M. Boyle; Captain H. A. Berryman; Captain W. G. Beyts; Captain J. M. Buist; Captain K. B. Barnett; Captain R. J. Blackham; Lieut.-Col. M. J. Bourke; Lieut. J. H. Brunskill; Surg.-Genl. Cuffe, C.B.; Surg.-Genl. J. A. Clery, C.B.; Col. Sir J. R. A. Clark, Bart.; Lieut.-Col. J. J. Crean; Lieut.-Col. A. B. Cottell; Lieut.-Col. A. F. S. Clarke; Lieut.-Col. A. E. J. Croly; Major H. Carr; Major R. J. C. Cottell; Major H. A. Cummins, C.M.G.; Major R. J. Copeland; Captain R. W. Le H. Cooper; Lieut.-Col. W. G. Don; Col. W. Donovan, C.B.; Major W. S. Dowman; Major C. Dalton; Captain H. N. Dunn; Captain H. E. M. Douglas, V.C., D.S.O.; Lieut.-Col. A. M. Davies; Lieut.-Col. P. M. Ellis; Major J. S. Edye; Captain P. Evans; Major H. P. G. Elkington; Surg.-Genl. Sir J. Fayrer, Bart., K.C.S.I., K.H.P.; Major H. J. Fletcher; Major R. H. Firth; Major N. C. Ferguson, C.M.G.; Captain C. M. Fleury; Captain H. C. French; Captain C. E. P. Fowler; Captain A. C. Fox; Surg.-Genl. W. J. Fawcett; Major C. E. Faunce; Lieut.-Col. R. W. Ford, D.S.O.; Col. W. L. Gubbins, M.V.O.; Major J. H. Greenway; Major W. L. Gray; Captain T. W. Gibbard; Dr. J. Galloway; Surg.-Genl. Sir W. R. Hooper, K.C.S.I.; Lieut.-Col. J. Hickman; V. Holt, Esq.; Lieut.-Col. H. W. Hubbard; Lieut.-Col. F. A. Harris; Lieut.-Col. F. Harwood; Lieut.-Col. J. Hector; Lieut.-Col. G. A. Hughes, D.S.O.; Lieut.-Col. S. Hickson; Major G. E. Hale, D.S.O.; Captain H. A. Hingo; Captain A. W. Hooper, D.S.O.; Captain E. C. Hayes; Captain A. F. Heaton; Captain H. A. L. Howell; Lieut.-Col. J. M. Irwin; Surg.-Genl. J. Jameson, C.B., K.H.S.; Dpty. Surg.-Genl. J. H. Jeffcoat; Col. H. E. R. James; Lieut.-Col. R. Jennings; Lieut.-Col. H. H. Johnston, C. B.; Captain J. C. Jameson; Captain T. P. Jones; Col. W. Johnston, C.B.; Lieut.-Col. H. C. Kirkpatrick; Surg.-Major C. R. Kilkelly, C.M.G.; Major J. Kearney; Captain F. Kiddle; Surg.-Genl. A. Keogh, C.B.; Col. G. D. W. Leake; Lieut.-Col. W. L. Lane; Lieut.-Col. S. F. Loughed, C.M.G.; Major W. B. Leishman; Captain C. B. Lawson, Captain R. N.

Longhurst; Lieut.-Col. G. T. Langridge; Surg.-Genl. W. H. McNamara, C.B., C.M.G.; Surg.-Genl. H. S. Muir, C.B.; Col. S. Maturin; Col. W. T. Hartin; Lieut.-Col. C. W. S. Magrath; Lieut.-Col. H. Hartin; Lieut.-Col. W. G. Macpherson, C.M.G.; Lieut.-Col. R. E. R. Morse; Captain G. A. Moore; Major J. Meed; Major H. B. Mathias, D.S.O.; Major J. D. Moir; Major T. McCulloch; Captain F. W. Mangin; Captain G. Merritt; Captain C. B. Martin; Captain J. F. Martin; Captain J. R. McMunn; Captain J. E. McNaught; Lieut.-Col. E. L. Mannsell; Captain G. S. Mansfield; Lieut.-Col. J. McLaughlin; Col. W. A. May, C.B.; Lieut.-Col. H. J. O'Brien; Lieut.-Col. R. F. O'Brien; Lieut.-Col. T. J. O'Donnell, D.S.O.; Dr. E. C. Perry; Surg.-Genl. A. F. Preston, K.H.P.; Lieut.-Col. R. Porter; Major S. C. Philson; Captain C. E. Pollock; Captain E. M. Pilcher; Captain C. W. Profeit; Major R. I. Power; Major H. J. Parry, D.S.O.; Lieut.-Col. W. W. Pike, D.S.O.; Col. R. H. Quill; Lieut.-Col. G. W. Robinson; Lieut.-Col. S. C. B. Robinson; Surg.-Genl. J. C. B. Reade, C.B., K.H.S.; Lieut.-Col. E. A. Roche; Lieut.-Col. W. L. Reade; Lieut.-Col. M. W. H. Russell; Lieut.-Col. J. H. Reynolds, V.C.; Lieut.-Col. W. J. R. Rainsford, C.I.E.; Lieut.-Col. S. K. Ray; Lieut.-Col. J. I. Routh; Captain N. J. C. Rutherford; Surg.-Genl. W. F. Stevenson, C.B.; Surg.-Genl. P. B. Smith; Lieut.-Col. G. H. Sylvester; Lieut.-Col. B. M. Skinner; Major W. P. Squire; Captain C. T. Samman; Captain J. C. B. Statham; Major C. S. Spong, D.S.O.; Captain W. W. Scarlett; Captain H. G. F. Stallard; Lieut.-Col. R. H. S. Sawyer; Surg.-Genl. Sir W. Taylor, K.C.B., K.H.P.; Surg.-Genl. E. Townsend, C.B., C.M.G.; Lieut.-Col. G. T. Trewhman; Lieut.-Col. G. E. Twiss; Captain G. St. C. Thorn; Captain C. T. W. Tatham; Captain W. J. Taylor; Lieut.-Col. W. Temple, V.C.; Surg.-Genl. T. Walsh; Surg.-Genl. J. Warren; Surg.-Genl. Sir W. B. Wilson, K.C.M.G.; Lieut.-Col. G. E. Weston; Lieut.-Col. H. R. Whitehead; Lieut.-Col. E. M. Wilson, C.B., C.M.G., D.S.O.; Major J. B. Wilson; Captain A. O. B. Wroughton; Captain E. M. Williams; Lieut.-Col. E. O. White; Captain A. L. Webb; Major M. T. Yarr.

Letters were received from Surg.-Genl. A. F. Bradshaw, C.B., K.H.P.; Mr. Alfred Fripp, C.V.O., C.B., and others, regretting their inability to attend, and wishing all possible success to the Corps.

CRICKET.—Up to the present the Corps has done well in cricket at Aldershot this season. Each of the three matches played have been won easily.

On May 11 the 2nd Lancashire Fusiliers were defeated by 48 runs. Lieut. on Probation J. B. Meldon contributed 55 to our score, and Pte. Black, R.A.M.C., took 6 wickets for 29 runs.

On May 16 the Corps played the 2nd Royal Scots Fusiliers and won by 6 wickets and 54 runs. Lieut. Black, R.A.M.C., made 39, and Pte. Black, R.A.M.C., took 6 wickets for 24 runs.

On June 1 another success was scored, the 2nd East Yorks Regt. being beaten by 1 wicket and 117 runs. Staff-Sergt. Waters made 84, and Pte. Black beat his record as a bowler in the previous matches by taking 9 wickets for 27 runs.

A match was played at Woolwich between the 10th Company R.A.M.C., Chatham, and 12th Company R.A.M.C., Woolwich, the former scoring 51 against 39 by the latter. A very pleasant match, ending in a win for the 10th Company by 12 runs; scoring was low owing to the sodden turf. After the match No. 12 Company entertained their comrades of 10th Company to tea and a smoking concert. A most enjoyable evening was spent. The return match will be played at Chatham in August.

In a match at Rochester on May 23, the 10th Company R.A.M.C., Chatham, scored 53 against 33 by the Conservative Club, Rochester. A special feature of this match was the bowling of Pte. Gander of the Corps, who took 8 wickets at an expense of only 8 runs.

A match was played at Dublin, on June 6, between the R.A.M.C. and the Army Service Corps, which ended in a draw. The R.A.M.C. scored 317 runs, of which number Major Trotter contributed 148 not out, six others reached double figures, the scores over 20 being Pte. Chadwick 30, Pte. Emblin 25, and Sergt.-Major Watterton 22. The Army Service Corps made 153 for 4 wickets, 55 being contributed by Sergt.-Major Shuter, 39 by Corporal Metcalfe, and 33 by Corporal Minterne.

FOOTBALL.—The Aldershot Junior League football cup and medals were presented to the winning team of the R.A.M.C. by Lieut.-Col. Robinson, O.C. Depot, on May 29, at a Smoking Concert. Lieut.-Col. Robinson, in handing over the cup and medals, remarked that it was not every day that the R.A.M.C. were able to bring home an open cup, as all had such a lot of important professional matters to think of, but it was a pleasing thing to know that when we were able to turn our attention to athletic matters we were able to hold our own with the best of them. This cup had been won after four severe struggles by the men playing the game together, without any individual hanging back, and without any individual showing off. The cup would be placed in the Men's Reading Room of the Regimental Institute in order that those who won it might have an opportunity of constantly seeing it, and also that it might stand there as an object lesson to all the men of the R.A.M.C., to play the game together not only in athletic contests, but in those serious and important duties for which their Corps existed.

BIRTHS.

JOHNSTON.—On April 13, at Jubbulpore, the wife of Lieut.-Col. W. T. Johnston, R.A.M.C., of a son.
LEISHMAN.—On June 3, at Twickenham, the wife of Major W. B. Leishman, R.A.M.C., of a daughter.
SIMPSON.—On June 14, at Ealing, the wife of Lieut.-Col. R. J. S. Simpson, C.M.G., R.A.M.C., of a daughter.
TYACKE.—On June 5, at Shoburness, the wife of Captain N. Tyacke, R.A.M.C., of a daughter.

MARRIAGES.

FAICHNIE—NUTTALL.—On April 24, at St. Peter's Church, Fort Colombo, by special licence, Captain Norman Faichnie, R.A.M.C., second son of A. G. Faichnie, late Deputy Postmaster-General, Central Provinces and Berar, India, to Margaret Beauchamp, eldest daughter of the Rev. W. Nuttall, Vicar of Atherton, Manchester.

DEATHS.

SCOTT.—On April 27, at Tivoli, near Rome, Colonel Frederick Beaufort Scott, C.M.G., R.A.M.C., very suddenly, in his 65th year. Colonel F. B. Scott joined the Service on October 1, 1862, and the following year was gazetted to the 18th Hussars, with which regiment he remained until the abolition of the regimental system. He served in India, Gibraltar, the Cape and Egypt; accompanied the Empress Eugenie on her visit to South Africa after the Zulu War, and was attached to the Staff of H.R.H. the Duke of Connaught in the Egyptian Campaign of 1882, and afterwards in India. He retired on December 9, 1898, while P.M.O. of the North-Western District, and was awarded the C.M.G. for his services in 1882.

SAMPSON.—On May 6, at Bournemouth, Robert George Sampson, of Wayford, Chiswick, and late Army Medical Staff, aged 81 years. Mr. R. G. Sampson entered the service as Dispenser of Medicines on December 1, 1854, was gazetted Apothecary to the Forces in 1868, and retired on February 18, 1885, after thirty years' service, all at home and at headquarters.

McARDLE.—On June 16, at Khartoum, from abscess of the liver, Captain J. McArdle, R.A.M.C. Captain McArdle joined the Royal Army Medical Corps on July 28, 1897, after having distinguished himself during the probationary course of instruction in the Army Medical School at Netley. In January, 1899, Captain McArdle was *seconded* for service in the Egyptian Army. His war services include the Nile Expedition, 1898, and the occupation of Crete. He was a promising officer, whose early death is much regretted.

CORPS ORDERS by Surgeon-General Sir W. Taylor, M.D., K.C.B., K.H.P.,
Director-General Commanding.

*Head-quarters, War Office,
June 3, 1903.*

The following Promotions to complete establishment will take effect from the dates specified :—

To be Sergeants.

No.	Rank and Name.	Date of Casualty.	Remarks.
8,558	Lce.-Sgt. Page, F.	18.2.03	With seniority next above No. 11,654 Sgt. H. Glenn.
8,439	„ Snowden, E. B.	22.5.03	On being posted to the S.E.D. Co. R.A.M.C. (Militia) for duty in accordance with para. 1,863, King's Regulations.
5,551	„ Hart, H.	3.6.03	Special as Superintending Cook.
5,022	„ Hunt, G.		Special as Clerk.
8,391	„ Foote, F. T.		Special as Clerk.
10,638	„ George, F.		
8,603	„ Jenkins, F. W.		
7,902	„ Stevenson, J. E.		
10,304	„ Dearsley, A.		
10,699	„ Conolly, B. D.		

To be Corporals.

No.	Rank and Name.	Date of Casualty.	No.	Rank and Name.
11,147	Lce.-Cpl. Maxwell, C. E.	3.6.03	13,003	Lce.-Cpl. Rose, S. G.
12,191	„ Sweetman, W. A.		15,292	„ Penton, J. E.
10,580	„ Gibbons, A.		14,117	„ Godber, V. C.
7,530	„ Hague, W.		14,287	„ Chandler, W. H.
18,078	„ Ralfe, W.		14,290	„ Scott-Badcock, W.
9,747	„ Williams, C.		14,369	„ Newhouse, E.
10,127	„ Lishmund, E.		14,505	„ Jones, H.
11,741	„ Hudson, H.		14,602	„ Hughes, J.
11,777	„ Overton, G. W.		16,402	„ Colls, S. R.
12,142	„ Enders, L. E.			

The following Appointments to Lance rank will take effect from the dates specified :—

To be Lance-Corporals.

No.	Rank and Name.	Date of Casualty.	Remarks.
11,335	Private McGill, J.	18.2.03	With seniority next above No. 11,739 Lce.-Cpl. J. Brean.
11,974	„ Newton, C. T.	3.6.03	
8,698	„ Gauder, E. A.		
8,885	„ Gibbons, H.		
9,029	„ McEvoy, F. A.		
10,967	„ Humphries, J. W.		
13,027	„ Cautrell, J. B.		
13,317	„ Wheeler, C. F.		
13,666	„ Hughes, W. C.		
13,856	„ McKay, R. J.		
13,892	„ Dixon, H.		
16,227	„ Ashworth, J.		
14,353	„ Reeve, W.		
14,434	„ Dobson, T. D.		
7,134	„ Bowyer, A. E.		Special as Cook.
13,664	„ Dunn, J. C.		Special as Clerk.

Advancement of Orderlies.

A large number of men have been advanced to the grade of first- and second-class orderlies.

NOTICES.

The Director-General desires to bring to the notice of all members of the Corps that the Royal Army Medical Corps Fund includes within its scope a Compassionate Fund for cases of distress amongst warrant officers, N.C.O.'s, and men of the Corps, their wives, widows and children. Those who know of any deserving cases of distress are requested to inform, through the usual channels, the Principal Medical Officer of the District, who will report them, with his own remarks, to the Hon. Secretary, Compassionate Sub-Committee, R.A.M.C. Depot, Aldershot.

The Director-General desires to notify to all members of the Corps that Major R. H. Firth has undertaken the Editorship of the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS. There will be a section for items of Corps news, Standing Orders, Gazettes, &c., and contributions suitable for insertion are invited from officers, N.C.O.'s and men. Items of information likely to be of interest not only to the officers but also to the N.C.O.'s and men of the Corps will be very acceptable. They should be forwarded so as to arrive not later than the 12th of each month, addressed to Major T. McCulloch, the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W. All communications should, if possible, be typewritten, and one side of the paper only should be used.

The Director-General has great pleasure in acknowledging the receipt of £405 10s. 9d., which has been forwarded to him by Lieut.-Colonel F. A. B. Daly, C.B., on behalf of the members of the late No. 18 General Hospital, stationed at Charlestown, Natal. This money will be utilised for the benefit of widows and orphans of warrant and N.C.O.'s and men of the R.A.M.C., in accordance with the wishes of the donors.

E. M. WILSON, D.A.D.G.
Army Medical Service.

THE R.A.M.C. FUND.

ON March 7, 1902, the present Director-General A.M.S., Sir William Taylor, K.C.B., K.H.P., issued a circular to the Corps (including in this term officers on retired pay as well as those now serving) in order to ascertain the feeling with regard to a Fund for Perpetuating the Memory of Distinguished Officers of the Corps. In this circular it was suggested that this might be carried out by a memorial to be placed in the Headquarter's Mess, or elsewhere; the memorial to take any form, such as paintings representing the deeds which won V.C.'s for officers, a Historical Record of the Army Medical Services, and special memorials of officers who have been distinguished during their career in the Service. In asking the opinion of each individual officer on the subject, Sir William Taylor pointed out that he considered a small annual subscription, if supported by the whole Corps, would suffice to carry out the scheme in time, and that a large and influential committee of officers would be necessary to decide questions as to the carrying out of the objects of the Fund.

The replies received to this circular showed a strong desire on the part of the Corps to support the wishes of the Director-General, and suggestions were made in these replies that the Fund should not be confined to memorials for officers, but should embrace other objects, such as the Band, a Mess Fund, and the Annual Dinner; that the proposed Historical Record should include the warrant officers, N.C.O.'s and men of the Corps.

Sir William Taylor then appointed a Provisional Committee to consider the whole question in connection with the wishes expressed by those who

had replied to his circular, to prepare a scheme for working the Fund, to initiate the working, and to nominate a permanent Committee, the filling up of retirements from which should be on a plan that will be automatic, thus obviating frequent reference to subscribers.

The following was the constitution of this Committee :—

	{	Surg.-Gen. Sir Jas. Hanbury, K.C.B.
Four Retired Officers ..	{	" J. B. C. Reade, C.B., K.H.S.
		" W. Skey Muir, C.B.
	{	Lieut.-Col. J. F. Beattie.
The Deputy Director-General (Surg.-Gen. Keogh, C.B.).		
The P.M.O. 1st Army Corps (Col. Notter).		
"		Netley (Surg.-Gen. Townsend, C.B., C.M.G.).
"		Home District (Col. Gubbins).
The O.C. R.A.M.C., Aldershot (Lieut.-Col. H. E. R. James).		
The Professor of Hygiene (Major Firth).		
The Director-General being the Chairman.		

On July 25, 1902, the above Committee met, and after discussing the various proposals as mentioned above, the following resolutions were passed :—

- (1) That a Permanent Fund should be established.
 - (2) That the names of distinguished N.C.O.'s and men of the Corps should be included in the Scheme for Memorials.
 - (3) That a Consolidated Fund should be established to include the Memorial Fund, the Annual Dinner Fund, and the Band Fund; but in the case of Retired Officers, they shall have the privilege of saying to which of the Funds their subscription shall go.
 - (4) That a General Meeting should be held on the day of the Annual Dinner, to which a statement of the proceedings of the Committee during the past year should be presented, and at which free discussion of all matters bearing on the Fund should be invited; while those unable to attend the Annual Meeting should be empowered to express their views by proxy should they wish to do so.
 - (5) That the Committee may also, whenever it thinks fit, refer any point to the subscribers.
 - (6) That a statement of the proceedings of each meeting of the Committee be published in the proposed Journal for Army Medical Services.
 - (7) That it should be referred to subscribers on the Active List whether their subscription to the Consolidated Fund should be fixed at one day's pay of rank, or £1 per annum.
 - (8) That the amount of subscriptions of Officers on the Retired List be left to their own discretion (see Resolution 3).
 - (9) That the official Army Agents for the Army Medical Services, Messrs. Holt and Co., be appointed Bankers to the Fund.
 - (10) That the subscribers be invited to give the necessary order to their Bankers to make an annual payment from January 1 next to the Fund at the rate to be fixed in accordance with the views of the majority of subscribers when expressed in reply to this circular.
 - (11) That the nomination of a Permanent Representative Committee be postponed until the next meeting, which will be held after replies have been received to Resolutions 7 and 8.
- And on the proposal of the Chairman :—
- (12) That Major B. M. Skinner, R.A.M.C., be appointed Honorary Secretary to the Fund Committee.

On July 31, 1902, Sir William Taylor circulated the above proceedings to the Corps, together with the following observations :—

" With reference to the above, as the Fund will now include the Annual Dinner Fund, which is in the hands of Lieut.-Col. E. M. Wilson, C.M.G., D.S.O., whose advice as my staff officer will be invaluable in dealing with questions arising on Resolution 2, I have added his name to that of the above Committee.

"I should like all recipients of this circular to give their opinion on the following point, for the consideration of the Committee at its next meeting, viz. :—

"A designation for the Fund which will be comprehensive."

"With reference to Resolution 8, an order to bankers will be attached to this circular, which should be completed and returned to the Secretary to the Committee as indicated on the form.

"With reference to Resolution 7, it must be understood that the sum of 5s. paid by many members of the Service to the Band and to the Dinner is included in the proposed subscription of officers on the Active List. Whether the amount of the annual subscription will be a day's pay or £1 will be decided by the replies recorded on the voting form (attached hereto) for officers on the Active List received up to date of the next meeting of the Committee, and will be notified to the Army Agents. A form of general order is also attached for officers on the Active List, which should be completed and returned to the Honorary Secretary as noted on the form.

"For the information of all I may add that I have received the names of 476 officers up to the present who have promised to support the Fund, which I have every reason to believe to be one which will prove of the greatest value to the Corps, and also one which will grow in size as its utility impresses itself on those who will see the formation of an Historical Record and a series of Memorials constituting records of the deeds of members who have passed, as well as those of the present, and of those who will follow."

The distribution of voting and of subscription forms was at once proceeded with. The collection of replies was a matter of time, owing, as all members of the Service are aware, to the difficulty of reaching officers scattered all over the globe, especially at a time when the termination of the war in South Africa necessitated a redistribution of *personnel*.

It became necessary before the end of the year to decide on the amount of the subscription, the designation of the Fund, the permanent constitution of the Committee, as well as other points; consequently a second meeting of the Committee was summoned for December 16, 1902, and took place on that date. The proceedings at that meeting have been circulated to subscribers, but are here reproduced for the information of those who have not seen them.

The second meeting of the Committee was held at 68, Victoria Street, S.W., on Tuesday, December 16, 1902, at 5 p.m. Present :—

Surg.-Gen. Sir William Taylor, K.C.B., K.H.P., Director-General
A.M.S. (Chairman).

Surg.-Gen. J. B. C. Reade, C.B., K.H.S., { Representing
" H. Skey Muir, C.B., { Retired Officers.

Lieut.-Col. J. F. Beattie,
Surg.-Gen. E. Townsend, C.B., C.M.G.

" W. H. McNamara, C.B., C.M.G.
Col. W. L. Gubbins, M.V.O.

„ (temporary) H. E. R. James.

Lieut.-Col. E. M. Wilson, C.B., C.M.G., D.S.O.
Major R. H. Firth.

MINUTES.

(1) The resolutions passed at the first meeting were confirmed.

(2) A permanent Committee was then elected, it being borne in mind that the process of filling the places of those retiring should be automatic, the Director-General, A.M.S., being the Chairman. With regard to Retired Officers, it was agreed that the representatives named above should retain their seats, and that when vacancies occur they should be filled up on the vote of Retired Officers who subscribe to the Fund.

Surg.-Gen. Sir James Hanbury, K.C.B., having resigned his seat on the Committee, as the state of his health necessitates his being in the South of England or abroad, it becomes necessary to proceed to the election of a retired officer in his place.

As regards officers on the Active List, it was agreed that the holders for the time being of the following appointments shall be *ex-officio* members of the Committee:—

- The Deputy Director-General (Vice-Chairman).
- The Deputy Assistant Director-General (A.M.D. 4).
- The P.M.O., 1st Army Corps.
- The P.M.O., Home District.
- The Commandant, Medical Staff College.
- The Professor of Hygiene, Medical Staff College.
- The Quartermaster, Medical Store Depot, Woolwich; and
- One Junior Captain, R.A.M.C., not necessarily a member of their Mess, to be elected by the officers of the R.A.M.C. Mess at Aldershot.

(3) The question of a concise name for the Fund was then gone into. Forty-three designations had been proposed by subscribers, many of a lengthy character. The title R.A.M.C. Fund, however, gained the largest number of supporters, 9. The title A.M.S. Fund had the next largest number, 5.

Of the remaining designations, seventeen began with R.A.M.C., with thirty-one supporters, and seventeen with A.M.S. or A.M., with thirty supporters.

It was resolved that the Fund be called the Royal Army Medical Corps Fund.

(4) The votes of subscribers were then taken in order to fix the amount of the annual subscription of officers on the Active List. Out of a total of 339 votes, 195 were for £1 per annum, and 144 for one day's pay of rank.

The question of a reduction of subscription for Lieutenants was next considered, and was negatived on the votes received from officers of that rank.

It was consequently resolved that the subscription to the R.A.M.C. Fund for officers on the Active List should be £1 per annum.

(5) The accounts of expenditure up to date were then examined, passed and signed by the Chairman.

The cash receipts had been £1 6s.

The total expenditure was £9 14s. 2d., including an honorarium of £2 to two clerks who had carried out the work of the Fund.

Lieut.-Col. Skinner was authorised to draw the balance due to him of £8 8s. 2d. as soon as funds were available at the Bankers.

Lieut.-Col. Skinner was further authorised to operate on the account for such expenses as may be necessary.

(6) A proposal made by Major Macpherson that this Fund should take over the existing "Benevolent Fund" was negatived. It was considered that such an undertaking involved too great a responsibility, even if it were practicable to interfere with trusts involved.

A proposal by Col. Exham that a Fund should be started to meet cases of distress among widows and children of deceased officers was negatived, it being felt that the R.A.M.C. Fund was not yet in a position to undertake such large financial matters as were involved in this and the preceding proposal.

(7) A proposal by Col. J. McNamara that the R.A.M.C. Fund should take up the question of a Compassionate Fund for W.O.'s, N.C.O.'s and men of the Corps, and their wives and families, on or off the strength, was agreed to in principle by the Committee; the following Sub-Committee was consequently appointed to fully consider and report to the Committee upon the subject, dealing in the report with such funds relating to the subject as already exist:—

- Surg.-Gen. H. Skey Muir, C.B.
- The P.M.O. 1st Army Corps.
- The Commandant, Medical Staff College.
- Lieut.-Col. Beattie.
- Deputy Assistant Director-General (A.M.D. 4).

(8) The above Sub-Committee was also requested to draw up a report containing a scheme for the due administration of each of the objects embraced by the Fund, having regard to the existing conditions of certain funds; and to the fact that retired officers have in many cases limited their subscriptions to certain objects.

The President of the Band Fund and the Secretary of the Dinner are members of this Committee.

It was suggested as a theme for discussion that these two Funds should continue to be administered as at present. With regard to the Dinner Fund, it appears

probable that if 5s. a head from Active List subscribers is allotted, there will be a larger accession of money to the Dinner Fund than is necessary for its maintenance, and it may be practicable and advantageous to lessen this allocation in favour of benevolent or compassionate objects. A report on this subject might be asked for from the Dinner Committee.

Until the Committee has decided these matters, Messrs. Holt and Co. should be requested to leave the subscriptions of Active List officers in a General Fund.

(9) In recognition of his efforts directed towards the interests of the Corps, it was resolved that a brass Memorial Tablet be erected to the memory of the late Surg.-Gen. J. B. Hamilton, at a cost not exceeding £20.

The Hon. Secretary was requested to write to Mrs. Hamilton informing her of this resolution, and asking what locality she would select for the reception of the Memorial.

The Third Meeting of the Committee was held at 68, Victoria Street, S.W., on Tuesday, February 17, 1903, at 4 p.m. Present :—

Surg.-Gen. Sir William Taylor, K.C.B., K.H.P., Director-General A.M.S.
(Chairman).

Surg.-Gen. J. B. C. Reade, C.B., K.H.S.,	Representing
„ H. Skey Muir, C.B.,	Retired Officers.
„ W. H. McNamara, C.B., C.M.G.	

Col. W. L. Gubbins, M.V.O.

Lieut.-Col. E. M. Wilson, C.B., C.M.G., D.S.O.

Major R. H. Firth.

Capt. J. F. Martin (elected by Officers, R.A.M.C. Mess, Aldershot).

Capt. and Quarter-Master G. Merritt.

MINUTES.

(1) The resolutions passed at the second meeting were confirmed.

(2) The reply of Mrs. Hamilton on the subject of the proposed Memorial Tablet to the late Surg.-Gen. J. B. Hamilton was read by the Chairman. Mrs. Hamilton expressed her thanks to the R.A.M.C. Fund Committee, and while pointing out that the Church at the Royal Victoria Hospital at Netley naturally appealed to her as a suitable locality for the tablet, she preferred to leave the decision in the hands of the Committee, expressing the wish that it be so located as to keep her husband's memory fresh among officers of the Corps.

It was resolved that the Memorial Tablet to the late Surg.-Gen. J. B. Hamilton be located in the Chapel at the Royal Victoria Hospital, Netley, as a temporary measure, a final decision being come to when the proposed Medical Staff College has been erected.

(3) The report of the Sub-Committee appointed at the last meeting to report on the Compassionate, the Dinner, and the Band Funds was considered, and after certain amendments, was embodied in the following Minutes.

THE COMPASSIONATE FUND.

(4) It was noted that the Compassionate Fund for N.C.O.'s and men already existing was raised for general purposes for cases of distress occurring among men, women, and children of the Corps. It was also noted that there are, besides the above, several sums collected in South Africa, and intended to be devoted *solely* for the benefit of widows and orphans, and that these sums were being kept separate until the donors have decided whether they shall be kept solely for that purpose, or be absorbed into the General Fund for cases of distress.

It was resolved that the Compassionate Fund be applied :—

(a) For all cases of distress among men, women and children of the Corps on or off the strength, in small grants as required, not as pensions, except in the cases referred to above, in which the donors may express a desire for some special application of their gifts. As soon as these cases are decided the money will be utilised according to the wishes of the donors.

(b) In subscriptions and donations to charitable institutions, hospitals, &c., so as to secure admission in suitable cases for men, women and children.

(c) In subscriptions to obtain admission for children into charitable schools.

A Sub-Committee, consisting of the P.M.O. 1st Army Corps, and Lieut.-Col. E. M. Wilson (D.A.G.D.), was then selected, with power to co-opt the existing Committee at Aldershot. The latter Committee will continue to sit at Aldershot and decide all cases as at present, and will submit a report quarterly to the R.A.M.C. Fund Committee.

It is impossible to calculate at the present time the probable help that may be required from the R.A.M.C. Fund, but when this quarterly report is presented the Committee will be in a position to know what grant should be allotted.

THE BAND.

(5) As regards the Band, it was resolved that the P.M.O. 1st Army Corps and the member elected by the Aldershot Mess (at present Capt. Martin) shall co-opt the present Band Committee at Aldershot, and make a quarterly report to the R.A.M.C. Fund Committee, presenting their accounts, and asking for a grant.

THE ANNUAL DINNER.

(6) As regards the R.A.M.C. Annual Dinner, the Director-General made the following observations and proposal:—

“Out of 522 subscribers to the R.A.M.C. Fund who are on the Active List, one has objected to any of his subscription being taken for the Annual Dinner; one other objects to the Dinner being supported by the Corps, but would pay for guests; a few others (six), while objecting to the Dinner Subscription, consent on the ground of *esprit de Corps* to support this institution.

“Of the officers on Retired Pay there are now 177 subscribers; of these fifteen do not support the Dinner. In recognition of the existence of this feeling, I think this Committee should not allocate the sum of 5s. to the Dinner Fund for all the subscribers, and I now propose:—

“‘That the sum of 5s. for not more than two-thirds of the subscribers be allotted to the Dinner Fund for this year only, the subscriptions of the remaining one-third being devoted to the Compassionate Fund.’

“The necessary allocation for 1904 can be made a year hence, when we shall all be better aware of the financial success of this Fund; and I know that I can rely on my officers supporting this arrangement, which will maintain the Corps Dinner on a footing as satisfactory as that which it has always held, while the Compassionate Fund of the Corps, which has hitherto been supported by local efforts, will become more widely known and cared for.”

This proposal, seconded by Col. Gubbins, was unanimously accepted as a resolution.

The P.M.O. Home District and Lieut.-Col. E. M. Wilson were appointed to co-opt the present Dinner Committee, and to make an annual report not later than April in each year to the R.A.M.C. Fund Committee; the first report to be presented by April next.

It was resolved that the civilian members of the Advisory Board shall continue to be Honorary Members, paying the full price of the Dinner as last year.

The question of the admission of guests was then discussed, and on the proposal of Major Firth, seconded by Col. Gubbins, it was resolved that the Annual Dinner shall be confined to members of the Corps, and the Agents—Messrs. Holt and Co. Lieut.-Col. Wilson was asked to inform those who had previously been invited as guests of this resolution.

(7) Owing to the retirement of Surg.-Gen. Sir James Hanbury, K.C.B., from the Committee, the votes of officers on Retired Pay were taken for the election of a retired officer to fill his place. Out of 52 votes received, 8 were for Lieut.-Col. E. Fairland; 7 for Col. Ligertwood, and 6 for Lieut.-Col. Hector, certain other officers having received from 1 to 3 votes each.

Lieut.-Col. E. Fairland was consequently declared to be elected to the Committee.

(8) The following resolutions as framed by Messrs Holt and Co., Bankers to the Fund, were passed:—

(i.) Resolved that Messrs. Holt and Co., Army Agents, of 3, Whitehall Place, be, and are, hereby appointed Bankers of the Royal Army Medical Corps Fund (late the Army Medical Services Fund for Perpetuating the Memory of Distinguished Officers, &c.).

(ii.) Resolved that Messrs. Holt and Co., be, and are, hereby authorised until

further orders to honour in all respects on the account the signature of the undersigned Lieut.-Col. B. M. Skinner, as Hon. Secretary of the Fund.

The Fourth Meeting of the Committee was held at 68, Victoria Street, S.W., on Monday, May 18, 1903, at 5.30 p.m. Present:—

Surg.-Gen. Sir William Taylor, K.C.B., K.H.P., Director-General.

„ J. B. C. Reade, C.B., K.H.S.,

„ W. Skey Muir, C.B.,

Lieut.-Col. E. Fairland,

„ J. F. Beattie,

Surg.-Gen. A. H. Keogh, C.B.

„ W. H. McNamara, C.B., C.M.G.

Col. W. L. Gubbins, M.V.O.

„ H. E. R. James.

Lieut.-Col. E. M. Wilson, C.B., C.M.G., D.S.O.

Capt. and Quarter-Master G. Merritt.

Representing
Retired Officers.

MINUTES.

(1) The Minutes of the third meeting were confirmed.

(2) The Report of the Sub-Committee for the Compassionate Fund was approved by the Committee.

The Director-General notified that since this Report was submitted he has received from the Charity Fund of No. 18, General Hospital, late S.A. Field Force, the sum of £405 10s. 9d. for the Fund for Widows and Orphans of the Corps; making the balance to credit of this Fund, £951 14s. 4d.

With reference to the distribution of these Funds, he pointed out that the items of expenditure, especially in the case of widows and orphans, indicate that many cases of distress have not been reported to those responsible for the disbursements. Under the trying conditions imposed by the late war on women, children, widows and orphans, on men disabled by sickness, he feels that the sums given in relief, amounting in fifteen months to only £173 16s. 9d., must be far below the calls which would have been made did the Corps know that the cases of those in real need would meet with consideration and assistance. In consequence, he begs all subscribers to the R.A.M.C. Fund to use their endeavours to ascertain and report fully all cases which in their opinion should be considered by the Sub-Committee for the Compassionate Fund; it is only by such action that deserving cases can be made known and receive the relief which it is our object to administer. There is no truer saying than "He gives twice who gives quickly"; there is no object in hoarding these Funds, and he only regrets that deserving cases have seemingly up to the present kept themselves hidden from those able and anxious to help them.

The Committee resolved, on the proposal of Surg.-Gen. Muir, seconded by Capt. Merritt, that the Director-General be asked to publish a Corps Order notifying the formation of the R.A.M.C. Fund. It is suggested that the Corps Order be in the following terms: The R.A.M.C. Fund includes within its scope a Compassionate Fund for cases of distress among warrant officers, N.C.O.'s and men of the Corps, their wives, widows and children. Those who know of any deserving cases of distress are requested to inform, through the usual channels, the Principal Medical Officer of the District, who will report them to the R.A.M.C. Fund Committee.

It was also resolved that Lieut.-Col. Skinner be authorised to inform the Secretary of the Soldiers' and Sailors' Families Association of the institution of the R.A.M.C. Fund (Compassionate Branch), and to ask him to inform the various branches of the Association of the fact. It should be pointed out that the Compassionate Fund is established with a view to relieving cases of distress among families, widows and orphans of the R.A.M.C., and the Committee would be glad to be informed of any such cases coming to the notice of the Association.

(3) It was resolved that an honorarium of £3 be given to clerks who had carried out the clerical work of the Fund up to the end of April, and that in future this work, which is done by clerks as "overtime," should be remunerated at the rate of 9d. per hour. The Hon. Secretary was authorised to pay clerks at this rate, keeping an attendance book as a record of the work done.

(4) The question of guests being invited to the Annual Dinner was reconsidered by the Committee. It was resolved that the question should be put to the vote at the General Meeting on June 15, next; and further, that the question of entertaining the Civil Medical Profession should be kept in view for future discussion.

(5) The Director-General notified that he had secured the United Service Institution for the purpose of holding the General Meeting of subscribers to the R.A.M.C. Fund, on Monday, June 15, next, at 3 p.m. He hopes that all subscribers who are able to do so will attend the meeting, and he will be glad to receive their opinions on matters connected with the Fund. In order to prevent any doubt or misconception, and to facilitate the business, he would suggest that subscribers having any concrete proposals to offer for consideration of the meeting should present them in a written form signed by the proposer to the Honorary Secretary at least two days before the meeting. The Committee agreed that this last point was essential.

(6) It was resolved that the Memorial to Surg.-Gen. J. B. Hamilton should be located temporarily in the Library of the Cambridge Hospital at Aldershot, where it may be seen by every officer of the Corps at some period of his career, instead of at the Royal Victoria Hospital, Netley; and that the under-named officers be asked to constitute a Sub-Committee to arrange for the execution of the Memorial:—

Lieut.-Col. Hubbard.

Major Greig.

Capt. Martin.

(7) The report of the Sub-Committee for the Annual Dinner was approved by the Committee and is appended to these Minutes.

(8) The report of the Sub-Committee for the Band was approved by the Committee and is appended to the Minutes.

It was resolved that the sum of £45 per quarter be paid to the Band Committee. This Committee will be in a position later to make up the grant for the year to £200, should this sum be found to be necessary.

(9) On the proposal of Col. Gubbins, seconded by Surg.-Gen. Reade, it was resolved to erect locally at a moderate cost tablets or head-stones in memory of Officers, R.A.M.C., dying in the Service, it being understood that action would be only taken where no provision was likely to be made by relatives in this direction. The submission of such cases to the Committee for consideration will be left to the discretion of the P.M.O. of the district in which the deceased officer had been serving.

(10) The following Sub-Committee was appointed to consider and report upon what steps should be taken regarding the proposed Historical Record:—

Surg.-Gen. Muir.

Col. Weich.

Lieut.-Col. Fairland.

The Sub-Committee was also asked in the course of its inquiry to use its endeavours to collect reliable information as to personal reminiscences of the older members of the Army Medical Service from any officers who may be willing to supply them.

(11) Col. James agreed to obtain information and to report to the Committee upon the subject of the V.C. Gallery, to enable the Committee to deal with this question.

(12) The Director-General, on behalf of Lieut.-Col. Babbie, V.C., submitted to the Committee that the sum of £34 was due to Messrs. Holt and Co., on account of the Jameson Portrait Fund. The Committee resolved that the sum of £34 be given to that Fund.

(13) It was resolved that a full report of the R.A.M.C. Fund proceedings should be given to the Editor of the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS with a view to their publication in due course.

B. M. SKINNER,

Lt.-Col., R.A.M.C.,

Hon. Sec.

68, Victoria Street, S.W.

Reports of later meetings of the Committee and of various Sub-Committees will appear in future numbers of the Journal.

ANNOTATIONS.

HIS MAJESTY THE KING has been pleased to approve of the Herbert Hospital, Shooter's Hill, S.E., being designated the Royal Herbert Hospital.

OFFICERS now serving at home who served in India after November 24, 1902, should send their claims for any pay due to them under the revised scale of pay in that country to the Principal Medical Officer, His Majesty's Forces in India.

MOBILISATION.—Arrangements have been made to have at a station within the area of each Army Corps the equipment and transport of Medical Field Units. These units, it is intended, shall be mobilised for a certain time annually, and officers and men of the Royal Army Medical Corps serving within the Army Corps area will, under the orders of G.O.C.'s, be practised with them, and so become familiar in peace time with the conditions under which their work will be performed in time of war.

Arrangements for the mobilisation of these units in the 2nd Army Corps on Salisbury Plain are far forward. The course of training to be undergone is being looked forward to with great interest, and cannot fail to be of material benefit to those who are detailed to take part in it.

Once these trainings are fully established the war units of the Medical Service should no longer continue the hazy entities which they have hitherto been in peace to the junior Medical Officer who has not had the good fortune to see them at work on service.

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.—Miss Becher, R.R.C., Principal Matron, Miss McCarthy, R.R.C., Matron, and Miss Humphreys, Staff Nurse, were commanded to attend at the London Hospital on June 11 to receive badges presented by Her Majesty the Queen to those nurses who were specially selected from the London Hospital for service in South Africa during the war.

Miss Keer, R.R.C., Principal Matron, South Africa, embarked in the "Dunera" on June 10, *en route* to take up her duties in that country.

Miss Beardmore Smith, R.R.C., proceeded to Dublin on June 4, where she has been appointed Matron of the Royal Infirmary.

BRITISH MEDICAL ASSOCIATION, DUBLIN DIVISION.—The first Annual meeting of this division was held at the Royal College of Physicians on Thursday, June 4, Sir John Wm. Moore in the Chair. Among the officers of the Corps present were Lt.-Col. J. C. Dorman, C.M.G., Lt.-Col. R. H. S. Sawyer, and Majors O'Halloran and Saunders. The Honorary Secretary (Professor White) stated that through the influence of the Surgeon-General 3rd Army Corps, twenty officers had recently joined the Branch. Lt.-Col. J. G. MacNeece and Major D. M. Saunders were unanimously elected representatives on the Branch Council and Divisional Executive for the year.

ASSOCIATION OF MILITARY SURGEONS, U.S.A.—In a letter dated September 29, 1902, at the request of the President and members of the above Association, the Secretary, Major J. E. Pilcher, asked the Director-General to become a corresponding member of the Association, and this invitation Sir W. Taylor had much pleasure in accepting. The Association also invited all medical officers of the British service to become Associate Members, and decided that personal invitations should be sent to each officer individually. To facilitate this, instructions were issued to all principal medical officers of districts at home and of commands abroad to furnish Major Pilcher direct with the names and addresses of the officers serving under them. They were at the same time asked to furnish similar information with regard to medical officers of the Militia, Yeomanry and Volunteers, to whom also the Association desired to address invitations to become Associate Members. The annual subscription of an Associate Member is 3 dollars (twelve shillings). Officers whose names, from any cause, may not have been included in the lists, and who have not received the invitation, might take the opportunity of now communicating with the Secretary and Editor, Association of Military Surgeons of the United States, Carlisle, Pennsylvania.

R.A.M.C. (MILITIA.) — The annual dinner was held on June 8, at the Trocadero. Col. Sir F. Treves, Bart., K.C.V.O., C.B., who is the Hon. Col. of the Corps, presided, and was supported by Col. Sir J. R. Clark, Bart., C.B., Major W. W. O'Connor, and other officers of the Corps. Among the guests were Surgeon-Generals Sir W. Taylor, K.C.B., W. H. McNamara, C.B., C.M.G., and A. Keogh, C.B.; Major-Generals Sir A. E. Turner, K.C.B., and Sir W. Gatacre, K.C.B.; Sir J. Furley, C.B., Lt.-Col. Babbie, V.C., C.M.G., and Col. James, R.A.M.C.

NOTICE TO SUBSCRIBERS.

THE Editor will be glad to receive original communications upon professional subjects, travel and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications, &c., have been received from Major S. F. Clark, Major R. J. Cottell, Major Caldwell, Lt.-Col. Battersby, Lt.-Col. Lambkin, Major Jennings, Major Baylor, Major Horrocks, Capt. Howell, Capt. Gunter, Lieut. Stevenson, Capt. Erskine, Lieut. Lambelle, Capt. Graham, Capt. Read, Lt.-Col. Semple, Col. Exham, Lt.-Col. Loughheed, and Major Will.

Journal
of the
Royal Army Medical Corps.

Original Communications.

NOTES ON SURGICAL EXPERIENCES OF THE BOER WAR.

By SURG.-GEN. W. F. STEVENSON, C.B.

Royal Army Medical Corps.

WHEN the surgical experiences of the Spanish-American and Boer Wars are available in detailed histories of the events of these campaigns, and when they have been considered with the attention they will deserve, it is probable, or indeed certain, that the views hitherto held by military surgeons on various matters as regards diagnosis, treatment and prognosis of gunshot wounds will necessarily be subjected to considerable modification. These were the first campaigns in which the armies on both sides were armed with modern weapons, and in which the surgeons, practising their profession under the difficult circumstances of active service, published their methods of treatment, and the results obtained from them. In the Chilian War of 1893 both sides used small-bore rifles; but from a surgical point of view that war was wasted, because little or nothing was done to bring before our profession either the effect of the small projectiles on human tissues, or the results of the surgical treatment employed for the cure of the wounds inflicted by them. But already something has been done in this connection in America, by the reports of the Surgeon-General of the United States Army for the years 1899, 1900, 1901 and 1902,

and a vast amount of material recording our own experiences in South Africa is available at the War Office, which is now being worked into convenient shape for easy reference.

That the opinion and practice of military surgeons will undergo great changes in consequence of the experiences of the two late wars will depend on two things—the use of a hard-mantled bullet of small diameter and great energy, and the employment, so far as is possible in the field, of modern methods of surgical procedure. The damage done to the various structures of the body by the old and by the new bullet differs very greatly, the former, no doubt, producing more extensive injuries in certain situations and under certain conditions than the latter, and requiring more often the performance of radical operations for their cure. But I must confess that I am not one of those who look upon the small-bore rifle bullet as a “humane” and “merciful” one, terms frequently applied to it by surgeons in writing of its effects. With reference to the injuries it produces in certain situations—joints, the skull, the abdomen—perhaps it deserves to be held in better repute than did the older and larger rifle bullets. But this character of the modern projectile is conveyed to one’s mind by considering particular cases; it is neither humane nor merciful if we look at it from a more general point of view. Ascertain, for instance, what proportion of men hit by it in an engagement are killed outright on the field, and compare this with what happened in former wars. The lethal effects of small-arm fire has varied enormously in the wars of the last two hundred years, and these variations depend for the most part on the kind of operations being carried out, and on the nature of the ground which they covered. At Blenheim, in 1704, the proportion was one man killed to 1·3 wounded—nearly as many killed as wounded. At Borny and Vionville, the French lost only 1 to 7, almost the two extremes for all wars; while the available statistics for the whole two hundred years up to date show the average to be 1 killed to 4 wounded. In the late Spanish-American War, where small-bore rifles were used on both sides, the ratio of killed to wounded was 1 to 5·7 as an average for the three years of the war, and 1 to 3·1 for the year 1900. In the Boer War the similar ratio was 1 to 3·5 amongst officers, and 1 to 3·9 amongst N.C.O.’s and men; or, taking the average for the two late wars, the small-bore bullet has killed outright on the field one man to every 4·7 it merely wounded; and further, in both

wars, indeed, in all wars since the formation of special units for the purpose of picking up the wounded and carrying them to the field hospitals,—men hopelessly injured have been enabled to reach the field hospitals, only to die in a few hours, and thus diminish the apparent lethal effects of the missiles which wounded them. Looked at in this way, there is, no doubt, a little in favour of the modern bullet's "humanity," but it is only a very little.

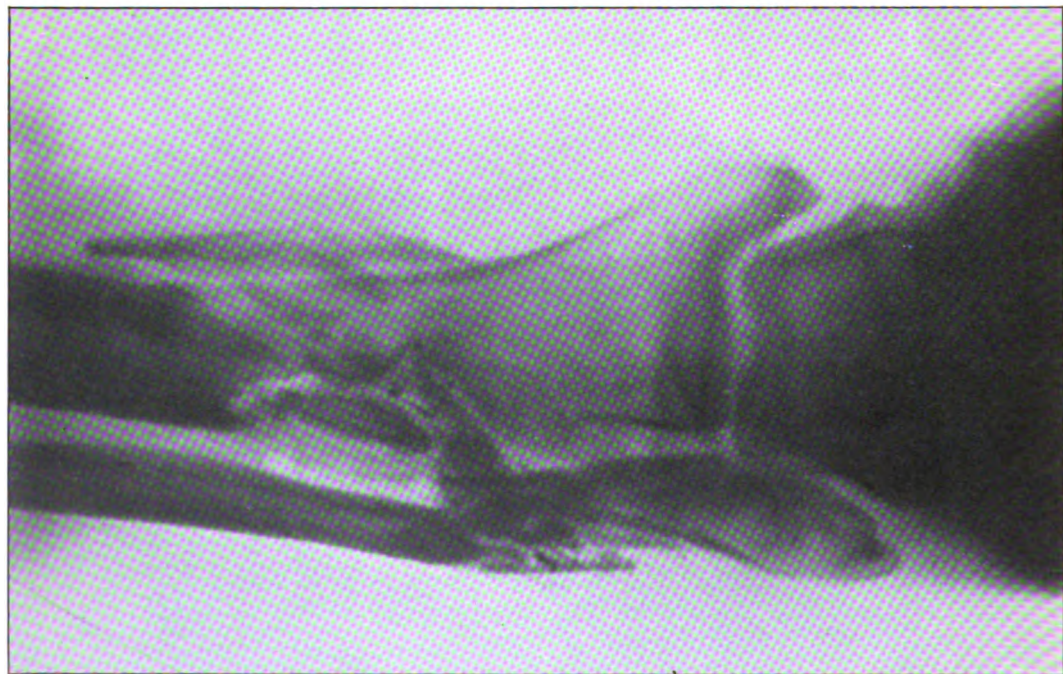
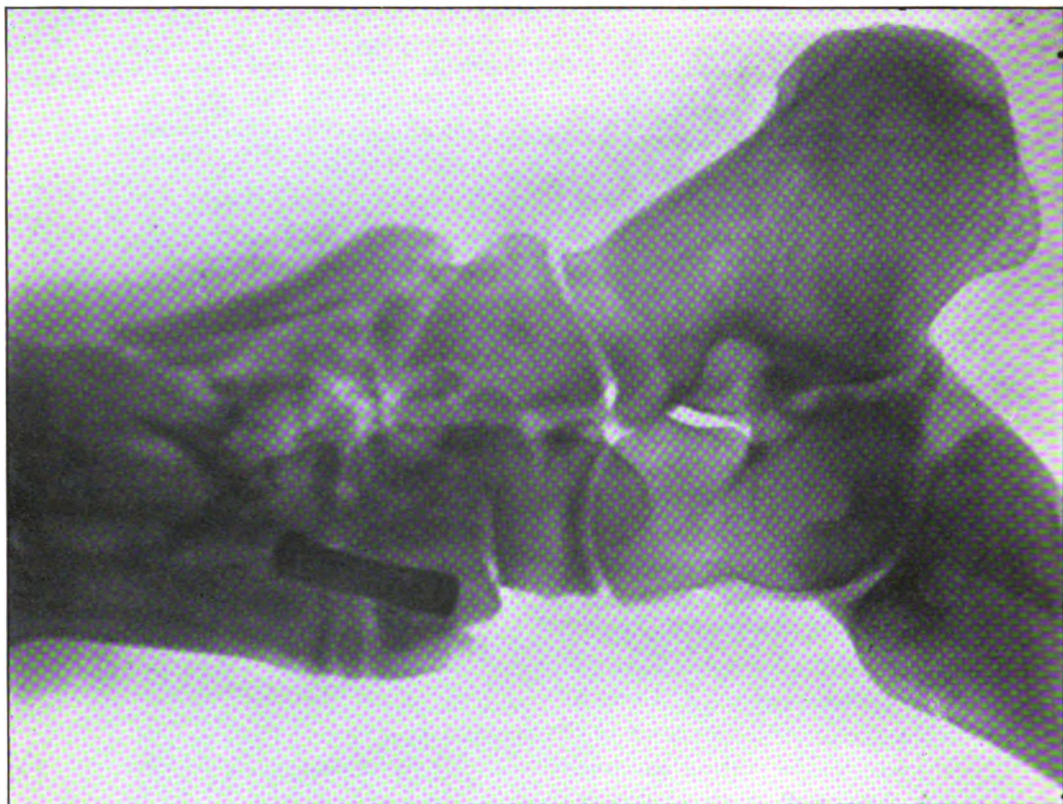
That the percentage of deaths among the wounded in war hospitals is much less than it used to be has also been placed to the credit of the new projectile, but undeservedly so, as I believe. That the endeavour to approach, as nearly as may be in a campaign, to the modern methods of surgical treatment employed at home is largely accountable for the diminished death-rates amongst the wounded I feel convinced, and that opinion is supported by the evidence of the reports of their experiences both by civil surgeons and by officers of the Royal Army Medical Corps. That the best possible has not yet been obtained from antiseptic methods in war must be admitted; but that the attempts made in South Africa towards that desired end were productive of excellent results is certain. A certain percentage—perhaps 20 per cent.—of cases suppurated; but one of the features of the surgery of the war was the comparative absence of surgical infective disease. Some few surgeons who were in South Africa hold but a poor opinion of the effects of antiseptic treatment in the Boer War, ascribing the good results which were obtained to the climate, the sunshine, the dry and pure air, &c. In the absence of the conditions they were accustomed to at home, those of civil hospitals at their best in these matters, they were unable to give any credit to first field dressings and to antiseptic materials in the treatment of the wounds. But on the other hand, there is much evidence directly opposed to this. I have had facilities for reading reports by a large number of surgeons who were at the war, and who, taking quite the opposite view, attributed the failure of antiseptic treatment to prevent suppuration when it occurred to the pest of flies, the high winds, and an atmosphere laden with dust, which permeated everything, do what they would to keep it out; in fact, they attribute everything to the climate and conditions under which they worked and which they were powerless to ameliorate. The condition of all others which was most inimical to antiseptic procedures in South Africa was the want of water suitable for making antiseptic lotions.

Unless antiseptic cleansing of the wound and of the skin around it is possible from the first, suppuration is certain to occur ; but the difficulties in obtaining water for preparing solutions at the front, at the bearer companies' dressing stations and at the field hospitals were often insuperable. Except in the larger towns—and often in them also—all the water to be obtained between Modder River Station and Koomati Poort was muddy, much of it being best described as dilute sewage. Muddy water will not pass through a Berkefeld filter, and boiling it was impossible in the vast majority of cases, because fuel was not available. Under these very adverse circumstances it was not to be expected that anything approaching ideal asepticism could be secured.

Nevertheless, all the trouble and expense paid to reach that ideal in South Africa were not merely so much wasted energy, for the mortality of the wounded in the hospitals was less than that of any previous war, except the Spanish-American. In the Civil War in America the death-rate amongst the wounded who reached the hospitals for treatment was 14·3 per cent., the vast majority of the deaths being due to infective disease resulting from suppuration. In the Boer War 8·7 per cent. of the wounded died, and in the Spanish-American War, 6 per cent. ; that is, that at an average for the two late wars, the deaths of the wounded were reduced by 50 per cent. as compared with the earlier war. Surely this was worth trying for, though it is not as good as might be expected under more favourable conditions.

Some surgeons believe that the low death-rate of the wounded in the Boer War was due to the trivial nature of the injuries produced by the small-bore bullets. No doubt they are trivial when unimportant soft parts only are traversed by them ; but in other cases the term cannot properly be applied to them. Statistics for the Boer War are not yet ready, but it is permissible to argue from the death-rates afforded by injuries in the various regions of the body in the Spanish-American War to the death-rates which will probably be found to be correct for the Boer War. The death-rates of gunshots of the skull, of the spine and of the abdomen in the Spanish-American War were not reduced, as compared with those for the Civil War, in nearly the same proportion as were those of the extremities. Therefore, if the general percentage of deaths is reduced, it must be in consequence of better results in injuries of the chest and of the extremities. Penetrating gunshots of the

412



To illustrate paper by Surg.-Gen. W. F. STEVENSON, C.B.

chest gave a mortality of 27·2 per cent., as compared with the former rate of over 50 per cent. This no doubt is largely due to the less severe injuries produced in the lungs by small projectiles, and antiseptics cannot claim much of the credit in this connection. But when the extremities are injured—and over 60 per cent. of all wounds seen in war are of the extremities—and when the large bones are fractured, the term “trivial” certainly does not describe the wounds correctly. When one examines a large number of cases or events in any connection, one is sure to find a considerable number of exceptions to the general rule, and so it was in South Africa. A considerable number of cases of clean perforations of long bones, or otherwise exceptionally slight fractures were observed; but any one who has studied the large number of skiagrams of fractures of the diaphyses of long bones which have been sent home from South Africa will, I feel sure, be more inclined to apply the term “terrific” rather than “trivial” to the injuries produced in these situations. These fractures were of the utmost severity as regards comminution, with fragments displaced up and down the limb to long distances, as well as forwards through the exit wound, lacerating the muscles, and frequently the vessels and nerves as well, thus giving rise to such serious complications as traumatic aneurisms and paralysis of the parts below. In many cases the site of the fracture was completely cleared of bone fragments, thus leaving a separation between the ends of the broken bones of many inches in length. The figures given in the accompanying plate are reproductions of skiagrams of cases met with in South Africa, and these could be added to in large numbers from the collection in the Royal Army Medical College; they can hardly be considered trivial injuries. Usually cases of this kind were produced at fairly short ranges—up to 600 yards; but at medium and long ranges, comminuted fractures of great extent were likewise experienced; indeed, it is well recognised that fractures produced at extreme ranges—over 1,700 yards—are often more severe than those caused at from 1,200 to 1,500 yards, in consequence of the bullet wobbling round a point just behind its shoulder.

In former wars cases of this kind were treated by primary amputation, because of the practically certain death which resulted from suppuration and septicæmia, if treated conservatively. In the Civil War of America, “44·4 per cent. of gunshot fractures

of the shaft of the femur were promptly amputated." In the Spanish-American War, 7·3 per cent. of similar cases were so treated ; while in the Boer War, if we put the ratio of primary amputations for fractures of all long bones at 4 per cent., we shall probably have overstated it. What, then, was the cause of these better results in the late wars ? Was it not the use of antiseptic methods, imperfect though they necessarily were, rather than that the injuries were trivial.

During the American Civil War conservative treatment of femur cases gave a death-rate of 49·9 per cent. ; in the Spanish-American War it was 13·1 per cent. ; and unless the fractures sustained by the American soldiers in Cuba were different to those seen among the British in South Africa, this lesser fatality must have been due, not to the insignificance of the injuries, but to the use of modern surgical procedures in their treatment.

One of the greatest predisposing causes of suppuration in fracture cases is the early transport of the wounded towards the base, so often rendered unavoidable by the necessity of evacuating field hospitals to enable them to advance with the brigades or columns. It does not much matter whether the transport is by wagon or by well-equipped hospital trains, nearly all the cases suppurate, especially those of the lower extremity. We had a valuable object-lesson in this respect among the wounded from Belmont, Modder River and Magersfontein, who were sent down to Cape Town by hospital train, most of them arriving in a septic condition, many of them dying, and many requiring secondary amputations. Whereas later experience showed—though it hardly required demonstration—that if cases of this kind could be transferred into stationary field hospitals near the field of battle, and treated there for two or three weeks, these untoward results were not produced.

Formerly it was a generally held opinion that if cases of severe gunshot fractures of the lower extremity had to be moved towards the base soon after the receipt of their wounds, primary amputation, although not actually indicated from a surgical point of view, gave the patients a better chance of life, and certainly saved them much pain and suffering. Mr. Makins points out in his "*Surgical Experiences*," that in South Africa amputation cases bore transport badly ; he "saw few in which flaps did not slough, or worse consequences ensue." This, no doubt, is perfectly correct,

but what both he and I saw of thigh and leg cases in Wynberg hospital after a 600 mile journey in a hospital train led me to believe that when treated conservatively they bore it still worse.

Gunshot fractures of the skull were a peculiarly interesting class of case in South Africa, and instructive as well. Practically all the cases wounded at short range—under, say, 150 yards—died immediately, or within a few hours; but the degree of injury to the brain decreased so rapidly with increase of range, that many extraordinary cases were seen in the hospitals, and some very marvellous survivals, not to say recoveries, were experienced. Otis, the writer of the surgical history of the American Civil War, mentions that fourteen of the cases of complete perforation of the skull lived to be invalided from the Service; that one of them was alive nine years later, but none of them were able to earn a livelihood. In the Boer War, complete perforation of the skull without death supervening was quite common. Many cases of the passage of a bullet through both frontal lobes without producing any symptoms were seen; and others in various situations, producing symptoms from complete hemiplegia and epileptiform convulsions to mere paresis of certain muscles, recovered sufficiently to be sent to England. Some, even of the more severe cases, apparently recovered completely, in that no symptoms remained when they left South Africa; but, judging from previous experience, the prognosis must be bad for a considerable time—perhaps years. One case I know developed epilepsy and insanity a year after his return in apparently perfect health, but has again recovered.

The experiences of this war have emphasised one point which was already pretty generally admitted—that all gunshot injuries of the skull require operation for the elevation and removal of the depressed and loose bone; that fewer mistakes will be made if the rule be followed that, in all cases in which there is evidence, no matter how slight, of contact of a bullet with the vault of the skull, an operation must be performed, rather than the practice that operations should only be undertaken in the presence of signs of brain injury. The evidence to this effect was beyond all doubt. Cases in apparently hopeless condition commenced to improve from within a day to a week after operation, and eventually were sent home more or less recovered. The use of the trephine is not required in the great majority of operations for gun-

shot injury to the skull, as there are usually apertures of sufficient size to admit the point of a Hoffmann's gouge forceps, or of Sir Victor Horsley's similar instrument. Moreover, the openings in the bone can be enlarged to any extent with these. Gutter fractures should be trephined at both ends, and usually the whole of the floor of the gutter composed of the comminuted and often depressed inner table requires removal. Civil Surgeon L. G. Irvine, who has written an excellent report of his experiences in South Africa, and published an article on head injuries in the *Lancet* of October 25, 1902, is of opinion that what he terms "superficial perforating" fractures—those in which there are two apertures in the skull, but close together, so that the track of the bullet lies close below the inner table—are a more fatal class of injury than the "deep perforating" fractures, in which the track of the bullet is lower down, and is the arc of a larger chord of the vault. Fractures in which the base, and more especially the posterior and middle fossæ, are implicated are the gravest of all; indeed, they practically all die, whether inflicted at long or short ranges.

One point with regard to gunshot fractures of the skull must impress one on reading the notes of cases in the late Boer War: the large number of recoveries which have occurred, notwithstanding the onset of suppuration in the wounds. It has always been recognised that the usual cause of death in those cases of gunshot of the skull which reach the field hospitals for treatment is septic meningitis, the result of infection of the wounds; and further, I believe I am correct in saying that when these wounds become infected, very little expectation of recovery was held. But in the South African War, experience showed that too unfavourable a prognosis need not be made under the circumstances referred to, for a very large number of such cases recovered without any untoward events complicating the convalescence. When, of course, the suppuration runs to the extent of hernia, or abscess of the brain, then, indeed, the case assumes a different complexion. What the death-rate of gunshot fractures of the skull in the Boer War will amount to is at present impossible even to guess; but although I have said a good deal as to recoveries in these cases, that being the interesting matter in connection with them, it is probable, judging from the statistics of the Spanish-American War, that they will still prove to have been a very fatal class of

injury. The use of small-bore bullets and antiseptics in the Spanish-American War only reduced the deaths in penetrating gunshots of the skull to 54.4 per cent., as compared with 59 per cent. for the Civil War of the Rebellion.

I shall bring this paper, already perhaps too long, to a close by short notes of two cases of gunshot fracture of the skull. In one case a Mauser bullet traversed the skull horizontally through both occipital lobes. The man was unconscious for a short time after the receipt of the injury, and on recovering from this condition found that he was totally blind. The blindness continued absolute for six hours, and then commenced to disappear. Vision improved fairly rapidly for a week, and then much more slowly. At the end of six weeks he could get about unassisted; but vision was still very defective, and was not improving. But the curious part of this case was that no other symptom except the one mentioned, cerebral or otherwise, presented itself previous to his being sent home.

The other was quite a surgical curiosity. The man was transferred to a general hospital six days after the receipt of a bullet-wound of the head. A shell had burst close to him, and he believed a small piece of stone had hit him on the forehead, but this proved to be incorrect. He described himself on admission as feeling "quite well." There was a small dry scab over the middle of the frontal bone, and no other wound. On touching the scab with an aseptic probe, the instrument passed into the skull. Three days later the temperature went up, cerebral symptoms commenced, and the man became very restless, almost violent. A flap was turned up, including the situation of the wound, and a small circular aperture was found in the bone; many loose spicules of bone were removed. This operation relieved all the symptoms immediately; but at the end of a week the same symptoms again appeared, and a fluctuating swelling formed two inches above the right auditory meatus. This was incised, giving exit to a large quantity of pus and a fracture of the skull was discovered. A trephine was applied, and some loose pieces of bone removed. It was then seen that the pus came from an abscess of the brain three inches deep, and passed out through the broken bone. This was irrigated and drained, the man making an uninterrupted recovery. A skiagram showed a Mauser bullet at the base of the brain!

EXPERIENCES OF X-RAY WORK DURING THE SIEGE OF LADYSMITH.*

BY LIEUT. AND QUARTER-MASTER F. BRUCE.
Royal Army Medical Corps.

As a preface to my experiences in Ladysmith during the siege, I wish to say that this paper will be confined to a simple account of how I was able to overcome difficulties in the management of the X-ray apparatus entrusted to my charge. It will therefore be outside my province to touch, other than in a general way, on the scientific principles of radiography. The surgical details will be carefully avoided, as not being a surgeon it is not my business to discuss them.

The siege of Ladysmith furnished the first occasion in which radiography was attempted under such a condition. It was here also that actual work was done under shell-fire for any lengthened period. I do not mean to positively state that in such circumstances insuperable barriers to practical radiography will always be present, but difficulties must necessarily be many, and each has to be overcome by some improvised method. Under ordinary conditions radiography is easily practised. When given a good instrument and a knowledge of procedure and electricity, our primary objective is within reach. In a siege you may expect to find things not so easy, and especially is this the case when, in a town such as Ladysmith, electric light has not been thought of, as it is generally the case that operators have to depend on town installations for having their batteries charged.

I was stationed in Cairo when I received my orders to proceed to Natal and to take a set of apparatus. The apparatus was forthcoming without any trouble, but to arrange for a supply of electricity was not so easy. From experience up the Nile, I knew that it would be useless to take the specially fitted up bicycle which had been tried as a motor for a dynamo. I confess I have no faith in manual aid for driving a dynamo, and I think you will agree with me when I tell you that it would be well nigh impossible to get men to drive with their feet such a contrivance for more

* This paper was read at a meeting of the Röntgen Society, February 7, 1901, but as it cannot fail to be of interest to our readers, we reproduce it.—ED.

than half an hour. Those gentlemen who are cyclists will more fully understand my point when I tell them that the power and endurance necessary to ascend a very steep hill on an ordinary cycle is like that which is experienced in charging six cells with the bicycle arrangement. It is climbing a never-ending hill, as it were; in fact, it may be likened to a treadmill. I have ridden a good deal on an ordinary bicycle, and I have tried to keep a set of batteries charged by the bicycle arrangement; thus, I think, I am entitled to speak from experience. When up the Nile, and the temperature in the hut over 100° F., much of this style of charging batteries left an impression on me that my relationship with a dynamo was extremely small. It was a good thing we had the batteries charged before proceeding, otherwise we should have been grinding away yet, with the result that they would not have been properly charged. This question of obtaining a supply of electricity, I must own, looked like a stumbling block; and under the circumstances I had to trust to luck, having no motor to drive my dynamo. I was entirely ignorant of the electrical resources of the country I was proceeding to, and was also led to believe that, if fighting did take place, the scene of action would be amongst hills, far removed from enterprising towns. However, I took the dynamo with me, trusting that some means might become available to drive it. My apparatus consisted of the following: an Apps ten-inch portable coil, with separate break; two four cell batteries, and six single cells; Mackenzie Davidson's localising apparatus; a supply of Deane's tubes, three of which were specially made for me, and two which had been used up Nile; a specially made screen; developing dishes; a small set of repairing tools, consisting of pliers, files and soldering materials; red lamps for developing room; plate rockers; sulphuric acid for batteries; Lumière plates; hyposulphite of soda, and alum; and Burroughs and Wellcome's compressed tabloids of soda developer—Ilford formula.

My destination was Pietermaritzburg, which I reached without any mishap occurring to any of the articles. Having unpacked my batteries, I made arrangements to have them charged without delay. I had this done at the Royal Hotel, as the town installation had no shunt-wound dynamos, and I was therefore not able to charge batteries from the dynamos generating electricity there. On travelling by rail from Durban to Pietermaritzburg, my atten-

tion was drawn to the fact that the train was lighted by electricity, and from enquiries made at the railway station, I learned that batteries were used for the lamps. This information gave me a clue, and I acted upon it. Accordingly, I submitted an application for two large railway batteries, which was approved, and these being provided, were sent on to Ladysmith. Later on I received instructions to proceed thither on October 16, taking all my apparatus with me. A set of apparatus under charge of Lieut. Weld, R.A.M.C., had preceded me, so that two sets of apparatus were now available. The sets were much alike, with this exception, that Lieut. Weld had lithanode cells. These, I am sorry to say, broke down entirely; whether from faulty charging, or from damage received during the journey from Pietermaritzburg, I cannot say, as I did not examine them. The cells brought from Cairo were the E.P.S. type, and had been used up the Nile. For general efficiency I do not think that better cells than these can be obtained. Those procured from the railway authorities were of very large capacity, but unfortunately, a large amount of leakage very soon became apparent, the voltage falling considerably, for which no reason could be assigned. Possibly the warm weather prevailing at the time had something to do with it, or perhaps, being the first charge, the voltage was not stable.

Two small dressing rooms in the Town Hall were handed over for X-ray work, one of which had the water laid on.

The apparatus was unpacked, and fortunately was found to have suffered no damage in transit.

The dark room was our first consideration, a very serviceable one being fitted up in the small room where the water was laid on. The fixed hand basin made an admirable sink, as the plates could be washed face downwards. The window was darkened by covering it with the table cover from the council chamber and a blanket; and to make everything secure, a blanket was hung up on each side of the door. For convenience in developing I fitted up two small electric lamps, to be worked from one of the batteries. One was red and the other white. These minimised the discomfort when developing in hot weather, as the best oil lamps give off heat.

Our next consideration was the fitting up of an X-ray room. The one at our disposal, although small, was convenient to the main hall, which was used as a ward, and patients could be brought

from thence to be examined with little or no discomfort. Few fittings were required for this room, and were easily obtainable. Again we had recourse to the council chamber, where we obtained a cover for our dark room window. In this instance we commandeered the table, as the pattern of the Mackenzie Davidson apparatus in our charge did not include an operating table. The council table was seven feet in length, of a convenient height, and being firmly built, answered all necessary requirements. To provide for the fluorescent screen being used during the day, blankets were nailed to the framework of the window, thus effectively blocking out the light.

The apparatus was fitted up, tubes tried, and all was now in readiness. The battle of Elandslaagte very soon furnished the first series of cases.

Comparatively speaking, the number of cases from this battle which required examination was not very large. Few patients had to be examined for bullets, the majority of the wounded having bone injuries, the extent of which had to be ascertained. This absence of imbedded bullets may be accounted for by the fact that the firing was at short range, and those bullets which did not pass through the parts caused severe injuries to the bones when these obstructed their course. All the bullets were successfully localised and subsequently extracted. Fortunately, in this our first work in the war, none were lodged in the pelvic region, as the Mauser bullet, being so small, proves very awkward to find in deep tissues.

All the instruments worked well, but unfortunately about this time the enemy had cut off the main water supply from the town, and nothing but a small and dirty service remained for use. This supply was, in addition, very uncertain, and many plates suffered through want of water for washing purposes. For a supply of clean water for making developers I was obliged to use a Berkefeld filter. The water was so dirty that only half a pint could be passed through the filter at a time, so soon was the candle blocked by the heavy layers of mud. For washing the negatives, after fixing, a plentiful application of a cotton-wool swab was the only means at command under the circumstances. Negatives obtained in this way cannot be good for reproduction; however, the surgeons were satisfied, showing that after all the main object had been attained.

From the battle on October 30, commonly known as Black

Monday, we had a good many cases having bullets to locate. A few of them were lodged in deep tissue, to discover which required that the instruments were in good working order. It is in these that good tubes become invaluable. When I say good tubes, I mean those having a maximum of penetration with a minimum of liability to heat the anodes. Without these attributes a tube is of little use when examining deep tissues with the object of discovering a small foreign body, such as a Mauser bullet. The search often occupies a lengthened period, and it is certainly of great advantage to do so uninterruptedly when once the eye gets accustomed to the screen. All Mr. Deane's tubes answered these expectations—the tubes which had been used on the Nile, and subsequently in the Citadel Hospital at Cairo. Altogether these tubes did duty in hundreds of cases, and are, I believe, in use in the Transvaal at the present day. For search work a good screen is indispensable. I was fortunate in having such. Its chief characteristics were very clear definition and a total absence of woolliness. The cryptoscope was the exact focal length, enabling one to see the whole screen at once; thus, impacted fractures, so difficult to discern by longer cryptoscopes, were more easily detected.

On November 1 rumours were afloat that the town was fast being surrounded by the enemy, and that we might expect to be beleaguered at any moment. This actually took place on the following day, proving the rumour to have been correct.

Unhappily, our supply of electricity was giving out, for a large amount of work had been done. The lithanode batteries were useless, and the railway batteries were low down. On the E.P.S. batteries we had therefore to depend, but they could not be expected to stand up for ever.

I ought to mention here that during the period from October 30 to November 3, shells were continually dropping in the neighbourhood of the hospital. Nevertheless, the work in the X-ray room was carried on as usual. Great caution had to be used in photographing the patients when shells were heard in the immediate vicinity, as they were sure to start, thinking the building would be hit. Exposures under these conditions had to be of the shortest, necessitating long developments. We eventually arranged for a look-out to announce the firing of the gun, which did much to facilitate our work.

As a certain amount of work had yet to be gone through, it became absolutely necessary to do something in the way of getting our batteries charged. This is how I managed. Close to the Town Hall is situated a flour mill, which kept going day and night. To this mill I went to interview the manager, with the object of asking his assistance to get driving power for the dynamo which I had brought with me from Cairo. This gentleman was most obliging, and anxious to help me to the best of his ability. As he had no suitable engine to offer me, I asked his permission to have the dynamo driven from the mill shafting. To this request he readily agreed, and a particular shaft was chosen. The number of revolutions per minute of this shaft having been ascertained, also the diameter of the pulley on the dynamo, it remained but a matter of calculation to find out what the diameter of the pulley should be in order to obtain a speed of 2,000 revolutions per minute on the dynamo. I am glad to say that this installation worked remarkably well, and charged the batteries most efficiently. Not only was I now able to supply my own wants by this means, but I was able to give effect to the wishes of Major Bruce, the chief operating surgeon, by supplying an electric light to the operating room for use at night. It was a great disappointment to us all when we were ordered to pack up our instruments and proceed to Intombi Neutral Camp on November 5. It seemed like breaking up our plant. However, we had to accommodate ourselves to circumstances, to show that we could be mobile when necessary. The apparatus was duly packed, and placed on a waggon drawn by six old horses. The dynamo was left in the mill in charge of the manager, so that it could be used at any future time for charging batteries. This sudden move to Intombi was rendered imperative by the fact that the immediate vicinity of the hospital was receiving too much attention from the Boer shells. The wisdom of this move was afterwards proved when several shells struck the building.

During the journey to Intombi Spruit the Klip River had to be forded, as it was too far out of the way to go round by the only bridge available. When half-way through the river the waggon stuck fast in the mud. Another waggon was procured from the town, and half the contents of the stuck waggon transferred to it in mid-river. In this transfer a few of the plates were spoiled and cases containing apparatus damaged. However, by using great care, nothing suffered damage from water. A fresh start was made,

and Intombi was reached without any further event. All the tents there were appropriated for the sick arriving from Ladysmith, and until others became available for our use, the baggage had to remain unprotected on the veldt where it had been unloaded. If the weather had kept fine there would have been no hardship in this, but the rain began to fall. Something, therefore, had to be done to protect the instruments, seeing that we could not get them housed. A railway waggon cover was commandeered, which, by propping up, protected everything from damage, the rain meanwhile coming down in torrents. Two days after a tent suitable for our use arrived from Ladysmith, and the instruments were safely housed. During the time we remained at Intombi no work was done during the day, for three important reasons: (1) we could not darken the tent sufficiently for general work; (2) the heat was too great for development; (3) I had to superintend the working of the Pasteur filters for supplying the sick and wounded with water, an employment occupying the greater part of the daylight. When the batteries required charging they were taken to Ladysmith by rail and charged during the night, as the people in the mill would not work during the day on account of the shell-fire.

Little of importance occurred, except the two sorties, until December 15, when I was ordered to take a set of apparatus to the town, so as to be handy for cases should the relieving column arrive, it being expected about this time. I asked the principal medical officer's permission to occupy the old rooms in the Town Hall. The permission was fortunately refused, for within a few days both the rooms were gutted by shells. I was ordered to find some place at the back of the hill, immediately in rear of the General's quarters. Two Indian hospitals were located there, the situation being really a nullah. No tent was available, also no house. There were two culverts near the place, under the roadway, which would have answered well; but as they were really occupied by families taking shelter from the shells, we were not justified in suggesting that they should be handed over to us, and the poor people evicted. Hence, by the help of Indian labour, we had to start and build a house. This house was not only to provide protection from the weather, but also to be proof against shells. To answer these requirements, the walls on two sides would need to be at least twelve feet thick. A commencement

was made, and a height of three feet reached. Suddenly a storm burst overhead, and in less than half an hour the entire bottom of the nullah was under water. The operating tent, hospital, and other tents were soon completely washed out, everyone taking shelter as best he could. You need not wonder that this site was abandoned, and a search made for another. The Congregational Church was chosen as a hospital, the vestry being used as an operating room; and for X-ray work a room in the house of an inspector of police was requisitioned. We were stationed here for nearly a week, doing little or no work. During this brief time a large number of shells fell in our immediate vicinity, cutting up the street in front of the house, besides doing damage to the houses. The relief column not arriving, I was ordered to return to Intombi, leaving the set of apparatus for use when necessary. Two sets of apparatus were now available at two different places, the one at Intombi having the most important work to do, as the wounded were still being sent there. Only on one occasion were the services of the set left in Ladysmith required, an Indian native follower being so badly wounded that he could not be removed to Intombi.

The battle on January 6 following furnished the next batch of cases. Some interesting cases were photographed, showing the behaviour of the expanding bullet occasionally used by the Boers. They showed the lead scattered about the injuries in all directions, the mantle remaining nearly intact.

From this time to the end of the siege only desultory cases were brought, hence our work was light. All cases of injury to bones were, however, periodically examined with the screen to note progress. The E.P.S. batteries remained to the last in excellent working order. As a rule, they were recharged once weekly, the voltage being kept up to two per cell. When the mills ceased working I had, with assistance of a Kaffir, to start the engine and keep it running all night, when required for the purpose of charging.

Nothing further remains for me to relate but to state the number of cases X-rayed, and the lessons to be learned for future guidance.

The number actually recorded is 200, of which nearly one half were radiographed. In addition, a vast number of cases under treatment were examined by the surgeons through the medium of the screen. As regards the general results by the apparatus, all were unanimous in saying that it was of the greatest assistance,

not only in locating bullets, &c., but also as an aid in the treatment of fractures generally.

As regards improvements necessary to make it more complete, only a few came under my notice. A properly constructed operating table is a necessity. It should be constructed so that the tube can be worked below or above the patient. By having the tube underneath, the thorax and pelvis can be more easily examined without discomfort to the patient. Such tables are, I believe, on the market, and will, if generally adopted, prove invaluable.

The generation of electricity is the chief point I should like to touch upon. I maintain that for field use a set of X-ray apparatus cannot be considered complete unless it includes its own means for working the coil direct, or, if desired, for charging batteries. Suppose that the recent war had been carried on in Abyssinia, or, in fact, in Central Africa, much of the services of this important adjunct to surgery would be minimised, simply because we should have to depend on outside aid for our motive power. And again, satisfactory work cannot be accomplished unless full power is available, and we can only hope for this consummation when we become complete in ourselves, that is to say, when we may have a motor to drive the dynamo. From an electrician of note I learn that my idea of a motor driving a dynamo in direct circuit with the coil is feasible. One of the motors for driving tricycles now so common, in addition to a small dynamo, would obviate the necessity of batteries, for these are troublesome articles to keep in working order during active operations. In general hospitals, which are stationary, and as a rule situated far forward on the lines of communications, the charging of batteries is only effected at great risk during transport to and from the base.

In conclusion, I may say that I am at present engaged in an attempt to arrange an apparatus which I hope will answer the requirements as regards weight, bulk and general effectiveness.

A CASE OF SPEAR WOUND OF THE HEART : OPERATION AND RECOVERY.

BY THE LATE CAPT. T. McARDLE.
Royal Army Medical Corps.

THE following case, in which a barbed spear was embedded in the chest, passing through the wall of the left ventricle, but without entering the cardiac cavity, successfully treated by operation, may be of some interest.

A. M., a Soudanese man, aged about 36, was admitted to

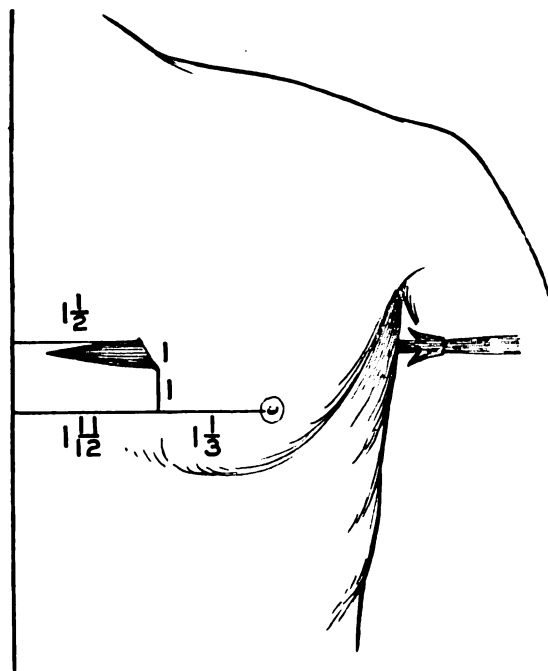


FIG. 1.

Kassala Military Hospital on July 19, 1901, with a barbed spear stuck in his chest. Its point of entrance was near the lower angle of the left scapula, and it projected about two inches in front, at a point midway between the left nipple and the midsternal line, and one inch above the nipple (see fig. 1). On

admission, the patient had some difficulty in breathing; there was very little pain, and only a slight oozing of blood from the wounds. An attempt to withdraw the spear caused considerable pain. On the following day I found the patient sitting up in bed owing to dyspnoea; pain very slight; pulse 92; respiration 28. The cardiac sounds were tumultuous and oppressed, but like those of an engorged heart. The chest was resonant under the left clavicle, but there was a complete absence of respiratory sounds over that area. Respiratory sounds were audible at the back of the left chest, but dulness on percussion was manifest over base of left lung.

Having taken all the precautions possible to ensure asepsis, chloroform was administered, and the following operation carried out: A \perp shaped incision was made, the vertical portion corre-

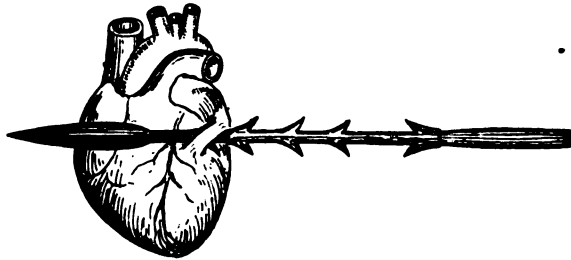


FIG. 2.

sponding to the entrance wound, the horizontal portion being six inches long, and carried around the chest forwards. Through this incision two inches of the sixth rib were removed, and six barbs of the spear freed. Believing that the spear was now free, traction was made on it; but the effort caused sudden syncope and gasping respiration. At the same time a free muscular mass appeared in the wound, a piece of which held another barb, as indicated in the diagram (fig. 2). This fleshy fragment, which was about one-eighth of an inch thick, and caused by the spear passing through the margin of the left ventricle, was now divided, the spear rapidly withdrawn, and the wound plugged with a sponge. Gradual restoration of pulse and respiration followed; the wound was sutured, &c., and the patient put to bed. The man recovered consciousness in a few minutes, with respirations 40 and pulse 100 per minute. In the evening, both the pulse and the

respirations were the same, the heart sounds were clear and unlaboured, in marked contrast to the condition before operation. From the time of operation the patient made an uninterrupted recovery, the respirations and pulse falling to normal. The following is the note for July 30 : Temperature 99·2° F., respiration 18, pulse 70. Wound completely healed up, except at the point of entrance of spear, from which there is a very slight discharge. Patient able to walk about the ward.

On August 8, on which date I left Kassala, the following note was made : Temperature, respiration, and pulse normal ; no discharge from the wound, which is now almost quite healed up. Respiratory sounds normal. On percussion, dulness at back of left chest. In front, the left side of the chest is not so resonant as right. Chest in front slightly flattened on left as compared with the right side. A letter from Kassala, dated October 4, 1901, stated that the patient was doing well.

The points of interest in the case appear to be as follows :—

(1) The slight general influence produced by operative interference with the cardiac muscle, and the rapidity of recovery.

(2) The profound disturbance caused by change in the cardiac position, as shown by the apparent (for the moment) fatal syncope which followed traction on the spear fixed in the ventricular wall.

(3) The peculiar modification of cardiac sounds produced by the presence of a foreign substance in the cardiac wall.

In March, 1902, nine months after the operation, Capt. J. H. Rivers, R.A.M.C., wrote to me from Kassala, stating that he had seen this man, and that he was in perfect health ; that he could detect no abnormality in the condition of the heart or left lung, and that the man was able to carry out efficiently his duties of an agricultural labourer.

TWO CASES OF PERFORATING GUNSHOT WOUND OF THE SKULL.

BY LIEUT.-COLONEL S. F. LOUGHEED, C.M.G.
Royal Army Medical Corps.

As illustrative of some of the difficulties, disappointments and encouragements associated with the treatment of extensive injuries to the head, I submit the following notes of two severe cases which were under my care during the recent war.

CASE No. 1.—Private C. H., aged 32, belonging to a local corps, was accidentally shot by a comrade with a revolver bullet (lead), 0·450 calibre, at a range of about one yard, near Phillipolis, on August 16, 1901. He fell immediately, and remembered nothing for three days. On the 19th it is reported that he was then sensible, had no paralysis or epileptiform seizures, but his wounds were septic.

Admitted to No. 12 General Hospital, Springfontein, under my care on September 8. He was found to have a small entrance wound in the centre of the left upper eyelid, granulating and oozing pus from its centre. The exit wound, about the size of a penny and irregular, was over the frontal bone, four inches above the level of the supraorbital margin and half an inch to the right of the median line; there was also a point of broken skin midway between these wounds. The granulations covering the exit wound were pulsating from pressure beneath. A gutter could be felt in the bone between the wounds which pulsated visibly. The exit wound was very septic. He had no paralysis. Temperature normal. Clear fluid (cerebrospinal) oozed in quantities from all three wounds, but mostly from that of entrance. Crepitus could be felt between the wounds, large pieces of bone being evidently separated along the line of flight of the bullet. The scalp was shaved, cleaned with carbolic solution and ether, and boric acid fomentations applied. Four grains of calomel were given.

On September 9, under chloroform, I made an incision from the entrance wound upwards and inwards along the line of the gutter to within one and three-quarter inches of the exit wound, and on reflecting the scalp removed many small pieces of bone. The cranium was perforated for about three and a half inches.

The dura mater was much torn, and several large pieces of bone embedded in the frontal lobe; these were all removed; the brain was much pulped. I then enlarged the exit wound and removed two large pieces of bone, one about one and a half inches square, from the margin of the exit perforation, separating them carefully from the pericranium with a rugine. Most of these pieces consisted of the whole thickness of the vault. A fungating mass of pulped brain tissue protruded through the exit aperture, in which a few small bone spiculæ were found and removed. Many fissures were found radiating from the exit opening, but as none of the pieces were loose or depressed, they were not removed. There were many sharp points of bone along the edges of the notch, which were removed by means of a pair of Hoffmann's gouge forceps. I then passed an index finger of either hand into the openings, and made them meet beneath the cranial vault, which was extensively fractured, but none of the pieces were loose, and I assured myself that no more pieces remained embedded. A medium drainage tube was then passed along the track, making the ends emerge from the original wounds, and the incision wounds closed with silkworm gut and dressed.

On the next day the patient was comfortable and had slept well, but there was much oozing of cerebrospinal fluid without blood-stain. I then removed the tube, and placed iodoform gauze drains in both wounds quite loosely. Temperature normal. A few convulsive twitches of the right leg and arm occurred six hours after the operation, but not afterwards. On September 11 there was much saturation of the dressings with cerebrospinal fluid; the gauze drains were removed, and fresh ones inserted. Wounds looking much cleaner, no purulent discharge. September 12: The patient passed urine in bed during the night, and has had persistent hiccough since midday yesterday. Slept little, and was very restless. Much fluid in the dressings, which were changed, and fresh gauze drains inserted. Wounds look clean. September 13: Temperature 103·4° F. last evening, and 101·6° F. this morning. Slept better; not so much oozing of cerebrospinal fluid; brain now rising to level of the skull vault and pulsating. The patient is still unable to control his bladder, but will not permit catheterism. Hiccough present at times, but is relieved by food. No vomiting. September 14: Temperature, 103·4° F. last evening, and 103·0° F.

this morning. Slept well during the night, and is drowsy to-day. Takes food well. Much oozing; dressings changed, and loose packing inserted. September 15: Some delirium during the night, sensible this morning. Temperature 102.4° F. last evening, and 102° F. this morning. Dressed wounds, and found them quite clean. Brain not filling up the cavity. Much oozing of cerebrospinal fluid. September 16: Temperature, 103.0° F. last evening, and 101.6° F. this morning. Patient had a restless night, and although he had twenty grains of bromide of potassium, slept little. Removed all stitches from scalp, the incision wounds being quite healed. Not so much oozing. Cavity in frontal lobe still large, and not filling up. Brain pulsation not visible to-day; no suppuration can be seen. Passes urine under him, but takes food well, and answers questions slowly. September 17: Temperature, 102.2° F. last evening, and 103.6° F. this morning. Had "Cheyne-Stokes" respiration very well marked yesterday afternoon, but this has gone to-day. Is very drowsy, no hiccough, and answers questions at times. Profuse discharge of cerebrospinal fluid. Dressings changed, appearance of wounds the same. September 18: Temperature last evening 103° F., and 103.4° F. this morning. Is quite unconscious. Respirations, 36; pulse, 124. Head dressed, cavity quite clean. The patient gradually became worse and died at 6.30 p.m., his temperature going up to 105.6° F. shortly before death.

Post-mortem examination, made on September 19, revealed the following: Entrance and exit wounds were as already described, looking perfectly clean. Late incisions quite healed up. When the body was turned into the prone position much pus poured from the wounds, especially the entrance one, quite five fluid ounces in all, and of a greenish colour. The scalp was dissected off, and the vault sawn through from ear to ear, and also from the two points backwards over the occiput. The posterior part of vault was then removed. The anterior parts of both frontal lobes were found to be quite broken down into the pus already mentioned, leaving a deficiency quite the size of a child's closed fist at the anterior and inferior parts. No other damage to brain, or any abscess in its deeper parts were present, neither was there any trace of meningitis anywhere.

No fracture of the base of the skull could be found, except the orbital plate of the frontal bone on both sides, which was much

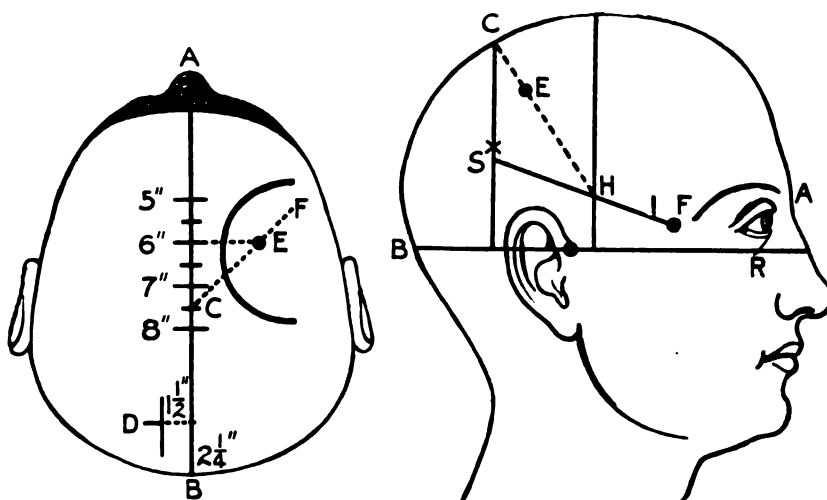
fissured and the pieces loose. The fissures communicated with the entrance opening in the vertical plate of the frontal bone. The fissuring of vertical bone was most extensive. The nasal process was completely separated from the superior portion by a fissure half an inch in width. A large notch existed in the left supra-orbital arch.

The coronal suture was separated along its whole extent, and on the left side of the median line a large square fragment of frontal bone was over-riding the anterior border of the left parietal bone. A large opening existed where the bullet made its exit, and where two large pieces of bone had been removed by operation. Along most of the lines of fracture attempts at repair had commenced, semi-organised lymph being present, glueing the edges together.

CASE No. 2.—Corporal F. M., aged 22, was wounded near Edinburgh, Orange River Colony, on October 26, 1901, at a range of about 1,500 yards. Was mounted when hit; remembered little of what happened till admitted to Springfontein General Hospital on the 28th. On admission the patient was conscious, but very drowsy, answered questions, complained of headache, and sighed frequently. Had complete motor paralysis of left arm and leg, but no loss of sensation. Knee-jerk on left side much diminished. Right arm and leg normal. No apparent difference in the two sides of his face. No loss of motor power in the facial muscles on left side. Tongue protruded straight. Pupils equal, dilated, but responding to light. Bladder and rectum under control of the will. Passed urine freely. He had two small wounds of the scalp, apparently caused by a Mauser bullet, which perforated the cranium. The aperture of entrance was circular, and had slightly inverted edges, being situated in the occipital region, one and a half inches to the left of the median line and two and a quarter inches above the external occipital protuberance. The exit wound was somewhat larger, rather irregular, and with everted edges, exuding some dark blood clot mixed with brain substance. It was situated in the right parietal region, two inches from the median line, and exactly over the fissure of Rolando. On palpation, a patch of crepitus, one and a half inches long by about one inch wide, could be made out running upwards and backwards from the exit wound. There was considerable œdema of the scalp around and between both wounds. The head was shaved at once, and the scalp cleansed (fig. 1).

On the next day, under chloroform, a semicircular division of all the tissues of the scalp and periosteum around the exit wound (base of flap downwards) was made, and after reflection of the parts the exit perforation in the bone fully exposed. This aperture was found to be surrounded by three or four fragments, which were both loose and depressed. These were removed; they are roughly figured in the accompanying drawing (fig. 2).

FIG. 1.



VIEW FROM VERTEX.

A—Base of nose.
 B—Ext. occipital protuberance.
 C—Upper end of fissure of Rolando.
 D—Entrance wound.
 E—Exit wound.
 F—Lower end of fissure of Rolando.
 AB—14 inches.
 CE—6½ inches.

RIGHT LATERAL VIEW.

A—Base of nose.
 B—Ext. occipital protuberance.
 C—Upper end of fissure of Rolando.
 E—Exit wound.
 H—Lower end of fissure of Rolando.
 BR—"Base line of Reid."
 FS—Fissure of Sylvius.

The opening was then enlarged with Hoffmann's gouge forceps, and about five smaller pieces of bone removed from between the vault and the dura. There was a small perforation of the dura, which was filled with blood and pulped brain substance. The dura around the perforation looked quite blue, as if from subdural clot, and as the brain pulsation was barely visible the dura was freely incised and some small clots removed. Only a little brain substance came away. A fracture extended downwards and outwards for one

and a quarter inches, from the lower margin of the opening, but no depression could be found there. After cleansing the parts the edges of the dura incision were united by means of a few fine silk stitches, and the flap replaced in position and stitched along its edge with silkworm gut. No drainage tube was put in, but the margins of the scalp exit wound, which were much contused, were pared with scissors to allow for drainage, and a temporary dressing applied. Next, incisions radiating from the entrance wound in the occipital region were made, and two flaps turned back, exposing a small perforation of the bone, with some *débris* lying in it. These were removed, and as a piece of the inner table had been fractured, and was pressing on the dura, that was removed, together with many small bone pieces which were

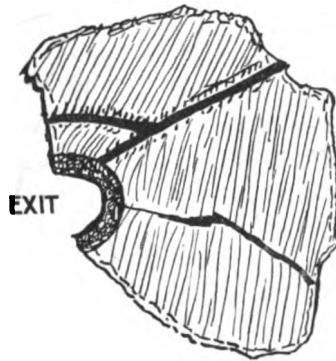


FIG. 2.

embedded in the track of the bullet. The brain was considerably lacerated. The reflected pericranium was now replaced, and the edges of the scalp incisions united by means of silkworm gut sutures. Both wounds were dressed with cyanide gauze and wool, but no drainage inserted.

The patient quickly recovered from the chloroform, and was free from pain. His temperature remained normal. November 1: No sign of oozing through the dressings; doing well. No movement of left leg or arm. The patellar tendon reflex in left leg has quite disappeared to-day. November 2: The wounds, on being dressed, were both clean. November 9: All stitches were removed; the wound soundly healed; bullet holes in scalp quite dry. November 11: This morning the patient suddenly

discovered that he could draw up his left knee, but was unable to move the toes of the same foot. The next day he moved his left elbow, but was quite unable to move the fingers. November 14: Improving every day. Visible brain pulsation at the entrance and exit scars. No return of reflexes in left knee or elbow. November 19: Reflex in right knee manifest to-day for first time.

The man's subsequent progress was entirely favourable. On November 27 he was allowed to sit up in a chair, and the power in the arm and leg rapidly improved. On December 10 he was able to walk about with the aid of a stick; while a fortnight later he could get about without any aid. He was invalided to England on December 21, and soon left for home, having recovered most of the power in the left hand, but his leg still dragged in walking.

I received a letter from this patient dated April 27, 1902, stating he was very well, had full power in his left hand, and could lift a chair with it over his head. His leg was quite strong, too, except that the toes felt cramped, and he did not suffer from any headache, except under excitement. During 1902 I had many letters from him, stating that under the influence of excitement or dietetic errors he had one or two epileptiform seizures. In the early part of this year I asked Mr. Keetley, of the West London Hospital, if he would kindly see the patient and do anything he thought necessary for him. Mr. Keetley was good enough to see him, and wrote to me on April 28 of this year: "He has had a few fits, it is true, but I do not think he will keep on having them. He has still a trace of loss of power in his left leg, and is a little neurasthenic, but requires, I think, no other treatment than country air, quiet, &c., and these he is getting."

AN HISTORICAL RETROSPECT OF THE ARMY SURGEON IN BRITAIN, PRIOR TO THE SIXTEENTH CENTURY.

BY CAPTAIN H. A. L. HOWELL.

Royal Army Medical Corps.

It is with the Roman armies in Britain that the army surgeon first appears in our history, and it is largely to the archæological researches of the late Sir James Simpson that we are indebted for our knowledge concerning him.

A Roman army was divided into legions. Each legion was made up of ten cohorts, and each cohort numbered six centuries. A legion therefore included a thousand men, but it also had auxiliary troops attached, as well as 120 horsemen. The auxiliary troops were arranged in cohorts varying in strength from 500 to 1,000 men. Many cohorts consisted of mixed foot and horse, thus constituting a "cohors equitata." The medical staff of a Roman army consisted of a surgeon or physician to each cohort. These were called "medicus ordinarius," "medicus clinicus," or "medicus cohortis"; but whether these terms referred to different grades in rank we are now unable to say. There is, however, evidence showing that there was a higher grade of medical officer in each legion, known as the physician of the legion. We also know that the Roman emperors, consuls and generals, had on their staff, when they took the field, several physicians and surgeons. These may have been medical officers of the highest rank in the army, but probably corresponded more closely with the "Sergeant-Surgeons" of later times. Galen himself was employed to attend upon the Emperor Marcus Aurelius on active service in Apuleia. The "Medici Militaris" were exempted from some taxes and the "Medicus Legionis" from civil duties when engaged upon the public service.

Many monumental inscriptions referring to the "medici" of the Roman armies are still extant. Thus, at Housesteads in Northumberland, on the site of the ancient Boscovinis, one of the military stations on Hadrian's Wall which stretched from Solway to Tyne, was found a monumental tablet inscribed—

Diis Manibus
Anicio
Ingenio
Medico
Ordinario Cohortis
Primæ Tungrorum
Vixit Annis XXV.

This has been translated "Sacred to the Gods of the Shades below, to Ancius Ingenius, Physician in Ordinary of the First Tungrian Cohort. He lived twenty-five years." Other inscriptions have been found; one at Viterbi, by a father to his deceased son M. Vulpinus Sporus, Physician to the Indian and Asturian Auxiliaries; another dating from A.D. 83, dedicated by "Sextus Titius Alexander, Physician of the fifth Prætorian Cohort, to Æsculapius and the safety of his fellow soldiers." Maffei also gives the inscription on a monument raised by Scribonia Faustina to the manes of her very dear husband, L. Cælius Arrianus, Physician to the Second Italian Legion, who died, aged 49½ years.

In A.D. 138, the Emperor Antoninus personally communicated by letter with the surgeon of the Second Legion.

When a Roman army encamped, the ground was first levelled by pioneers. The camp was quadrangular and fortified by a ditch and rampart. Twenty thousand men were accommodated in a camp 700 yards square. The streets were perfectly straight, and a space of 200 feet was allowed between the tents and the ramparts. A part of the camp—the Valetudinarium—was set apart for the accommodation of the sick and wounded. The general arrangements and police of the camp were superintended by the "Præfect Castrorum," a sort of quartermaster-general, and Vegetius tells us this official had disciplinary powers over the "medici" and their patients, and that he had to provide all that was required for the sick. The regulation of the expenses appears to have been in the hands of the medical authorities.

From Cæsar, Livy, Tacitus and Justin we learn that, after great battles near Roman towns, the wounded were received into the houses of the Patricians, and there attended by the surgeons. It would appear also that, except when encamped, in order that the army might not be encumbered in its movements, the sick and wounded soldiers were entrusted to the care of neighbouring Roman towns; and we find it recorded that at least two generals—Cæsar and Labienus—made use of waggons in transporting their wounded to such places.

Great attention was paid by the Romans to the prevention of disease, for we learn from Vegetius that great care was exercised in the selection of the sites of camps. The necessity for frequent changes of camp-sites was also recognised. Care was taken to provide supplies of good water, wine, vinegar, salt, provisions and forage. The ration of the soldier consisted chiefly of meat, flour and lard. When wine could not be provided, vinegar, or other acid, was usually added to the drinking water. The men were kept constantly at exercise during the day, and meals were provided at regular intervals. In hot weather marches were finished before the hottest part of the day, and in winter there was no marching at night. In cold weather a sufficiency of warm clothing and of fire-wood was always provided for the use of the men. The Roman soldier, when in heavy marching order, carried 60 lbs. weight, and he was expected to march twenty miles in six hours.

On those occasions when a Roman army was defeated and obliged to retreat and found it impossible to carry off its wounded, it appears to have been the custom to kill the wounded before the retreat commenced. Cassius tells us this was done when the Emperor Septimus Severus, after taking an army of 80,000 men across the Forth, had to retreat to York. He lost 50,000 men during the expedition.

Invalids incapable of further active service were provided for by the State. Old soldiers enjoyed many privileges, and, under Constantine, were rewarded with grants of land in perpetuity and exemption from taxation.

The chief guides to the practice of medicine and surgery amongst the Romans were the works of Hippocrates, Celsus and Galen.

During the four hundred years of the Roman occupation of Britain—a military occupation—large numbers of Britons were enrolled in the Roman Army, and towards the end of the Roman stay in Britain, legions of British soldiers were employed in supporting the Roman power on the Continent. Later on, we find that after the Romans had left some of the Roman military methods were adopted by British and Saxon armies. It is possible that their medical arrangements were also imitated, and it needs no strain of the imagination to think that the “*medici*” of the Welsh armies of later years—the descendants of the ancient Britons—represented the army surgeon of Roman times.

The introduction of Christianity into Britain led to the estab-

ishment of numerous monasteries, and into the hands of the monks fell most of the practice of medicine and surgery. To these monasteries were attached infirmaries to which the sick and wounded were admitted for treatment.

The Normans brought the feudal system to England. As a result, there sprung up over the land numerous feudal castles. Each lord had an armed force of retainers, and we know that to many of their households "leeches" were attached. In addition, the womenfolk of the period were instructed in the preparation of herbal remedies for the sick and of salves for the wounded. Upon them devolved a good deal of the care of the sick and wounded. There are numerous references in the romances of that time to the skill in leechcraft of women and monks.

During the period from the Conquest until the end of the thirteenth century, few members of the medical profession are mentioned in history. Creighton says, "the moral standard of the period was a low one and the profession was not one in which individuals could rise conspicuously above the level of their age."

Prior to the Edict of Tours, in 1193, the distinction between physician and surgeon scarcely existed. Learning and the practice of physic was almost entirely in the hands of the Church and Jews; the clergy having the bulk of the practice, as curing body and soul. In England, however, there were very few Jewish physicians and surgeons. In 1190 there were only two in all England, Isaac Medicus in London, and the great Jewish physician of King's Lynn, who fell in the massacre of the Jews in that year. Jews in England were practically restricted to one trade—usury. The Council of Tours decreed that the clergy should not shed blood and therefore could not practise surgery, whereupon came about a differentiation; the monks being tonsured, required barbers to shave their heads, and the barber was usually the clerical surgeon's assistant. Henceforth the barbers took over the surgical part of the profession, while their masters continued the practice of medicine and became the predecessors of the present physicians. It is this connection with the Church which explains the clause in the Act of 1511, that no one should practise as surgeon or physician in the City of London, or within seven miles of it, until he had first been examined, approved and licensed by the Bishop of London or the Dean of St. Paul's. The relation between the Church and the profession lasted for a long time, for according to Manningham's

Diary (1601-1603), "one Tristram Lyde, a surgeon, admitted to practice by the Archbishop's letters, was tried at Rochester Assizes for killing divers women by annoyntinge them with quicksilver."

Pope Honorius III. also directed that no priest should practise surgery, and that the clergy should refuse their benediction to those who professed it. Medicine then was practised by men of learning, while surgery, under the ban of the Church, fell into the hands of the barbers. The low social status of the surgeon during the Middle Ages is therefore easily understood. Surgery became a trade.

In Europe, medicine and surgery were at a standstill, and we must turn to the East if we wish to find evidences of progress in philosophy or medicine. The Saracens were moving westwards, and in 640, captured Alexandria and destroyed the great library there. The works of Galen were, however, rescued and, it is said, studied by Arabian philosophers. A great college of learning arose at Bagdad which contained at one time no less than 6,000 students.

The study of mathematics, astronomy and medicine made advances and chemistry originated. The wave of Mahomedan conquest swept along Northern Africa into Spain, and here the learning of the East came into touch with that of the West. The Crusades also drew attention to Oriental learning, and as a result a great school was established at Salerno at which the study of medicine and surgery was first put upon a sound basis. This college was the first to grant degrees in medicine. We find the medical student was obliged to study two years at philosophy, five at medicine, and if a student of surgery, one year at anatomy. The works of the great Oriental physicians and surgeons, such as Rhazes and Avicenna, thus became known in the West, and we find them quoted in the great mediæval work on surgery by Langfranc.

Very little is known about the army medical arrangements during the Crusades, but we gather from the early accounts of Richard I.'s Crusade that a complement of "leeches" accompanied the Crusaders. In the "*Itinerarium Perigrinorum et Gesta Regis Ricardi*," the earliest and best account of the Third Crusade, we read that after the great battle before Jaffa, in 1192, the putrefying carcases of horses and the bodies of the dead "made the air corrupt, King Richard and our army were much distressed, and fell ill to such an extent that they almost all died." "The King lay very

sick on his couch; the typhus continued, and the leeches were whispering about the greater semi-tertian fever. They began to despair and the (same) wild despair spread over the camp." During the same Crusade King Philip of France became seriously ill and he "sent to seek leeches, to whom he gave fair jewels, praying for their advice as to the best way of curing his disorder. The leeches took counsel together and God gave them His grace, so that he recovered of his ailment." His symptoms were those of malarial fever. In Saladin's army were many learned Arabian surgeons, and he appears to have been the first to attend to the personal hygiene of the soldier, for Abd Allatif, a physician of Bagdad, who accompanied his army, tells there were in his camp "more than a thousand baths" and a bath could be procured for a piece of silver. The sick and wounded Crusaders were chiefly attended by their comrades, but during the Crusades a great military and medical organisation sprang up around the Knights of St. John of Jerusalem (or the Hospitallers), one of the military orders. They possessed fortresses in Palestine and vast possessions in Europe. Their vows required them to protect and care for the pilgrims on their way to the Holy Sepulchre at Jerusalem. The order originated from the foundation of a hospital at Jerusalem, in 1023, by some rich merchants of Amalfi, who had won the favour of the Egyptian Caliph. This hospital was for the care of wounded and sick pilgrims. The original endowment was gradually added to and their possessions confirmed to them by a Bull of Pope Paschal II. in 1113. Gerard, the first master of the hospital of whom we have mention, died in 1118, and was succeeded by Raymond du Puy, who held office for forty years. He organised the order on a military basis, and the Hospitallers are first mentioned as a fighting body in a Bull of Innocent II. in 1130. The organisation was similar to that of the Templars and comprised knights, chaplains and serving brothers, under a Grand Master. The officers were termed conventual, capitular, or honorary bailiffs. The conventual bailiffs were the heads of the different Langues, of which there were, in 1337, seven—Provence, Auvergne, France, Germany, Aragon and England. The English Langue was under two Grand Priors, one for England the other for Ireland. The heads of houses or commanderies were called Commanders or Preceptors. All wore a black mantle with a white eight-pointed cross. Their chief English house, the gateway of which is still standing, was

at Clerkenwell, and owed its origin to Jordan Biset, who died in 1110. In Stephen's reign, lands were acquired in Hertfordshire, Essex and Cambridgeshire. The Order became very wealthy, and on the suppression of the Templars in 1312, many of the possessions of the Templars came to it, and on it devolved the defence of Christendom against the Turk. Driven from Palestine, the Knights went to Cyprus, and then conquered Rhodes, which they held against the Turks for two hundred years. Driven out by Soliman in 1512, Charles V. gave them Malta, where they remained until their Commander surrendered to the French, in 1798. Within recent years the English Langue has been revived. The old gateway of the Priory at Clerkenwell has again become the head-quarters of the Langue. The Prince of Wales is now the Prior of the Order. The Order still devotes itself chiefly to the care of the sick and wounded in peace and war, largely through a branch known as the St. John Ambulance Association. It has branches in nearly every English speaking town of any size in England and in the Colonies. During the Boer war, the Order of St. John of Jerusalem again appeared on active service with troops in the field, for its Ambulance Association has supplied trained orderlies to many of the hospitals. These men have well maintained the past traditions of the Order, and it would be impossible to over-appreciate the value of their timely aid to the Royal Army Medical Corps.

Returning to the Crusades, we note that under the auspices of the Knights of St. John, hospitals and hostels were established along the pilgrim routes for the use of those going to and returning from the Holy Land.

When Richard I. received his death wound at Chalus, in 1196, his surgeon was blamed for his death. He is said to have withdrawn the arrow so unskilfully that the wound was made worse and mortification followed.

Simon de Montfort had a barber surgeon learned in heraldic lore. On the morning of the Battle of Evesham in 1265, barber Nicholas was sent to the tower of the abbey to examine the banners and blazons of the approaching enemy and report who they were.

Edward I. had an expert surgeon with his forces in Palestine. In 1272, that prince was attacked and severely wounded by a follower of that leader of assassins, "the Old Man of the Mountain." Edward's life was in much danger, for the weapon was poisoned, and though the Master of the Templars administered what was

considered to be a certain antidote, it was without avail. At last an English surgeon came forward and pledged himself to effect a cure. He ordered the weeping Queen Eleanor to be led from her husband's presence; then he cut away the poisoned flesh, and under his care Edward was able to appear on horseback in public within fifteen days.

In England, in 1122, St. Bartholomew's had been founded, and shortly afterwards opened for the treatment of sick and wounded soldiers, as well as of the civil population.

When in the reign of Henry II. Strongbow invaded Ireland, he found the Irish Abbeys the seats of learning in that country, and that each of the Irish septs or clans had families of hereditary physicians. Hospitals were attached to the abbeys and to some of the castles, as at Sligo. O'Halloran tells us also that a great military hospital was attached to the ancient palace of Tara. It was called "The House of the Sorrowful Soldier."

In Wales, the medical profession held an honourable position under the ancient Welsh Kings. Probert tells us that the King's physician ranked twelfth among the officials of the Court. He held his land free and was clothed at the expense of the King and Queen. He was required to treat the Royal household without payment, with the exception of three classes of wounds, for attendance on which he received a fee of one pound, or if his meals were provided, one hundred and eighty pence. These wounds were "a blow on the head which penetrates the brain, a thrust in the body which penetrates the bowels, and the breaking of one of the limbs." If he were insulted the offender was fined six cows and one hundred and twenty silver pennies. His life was valued at one hundred and twenty cows.

In 1223 Henry III. was preparing a force for the invasion of Normandy, and the Bishop of Chichester was recommended to take with him "one Master Thomas, an army surgeon, who knew how to cure wounds, a science particularly useful in the siege of castles."

The earliest mention of the payment of medical men to attend the army appears in the Wardrobe Account of 15 Edward II., A.D. 1322. In the Welsh corps officers were called "medici," but whether surgeons or physicians we cannot say. No "medici" were charged to the English troops, and amongst the Welsh troops they were unevenly distributed. We find one corps of 1,907 men

with only one "medicus," whilst another, numbering 968, had two. The latter corps came from the King's land in Cardiganshire, and its "medici" only received fourpence a day each. The other "medici" received pay at the rate of sixpence a day each. Money at this date had from twelve to fifteen times its present value.

These Welsh spearmen, to which we find the "medici" attached, were the first troops in the English service to wear uniform, and they first received it in 1337. They were each provided, at the King's expense, with a tunic and mantle, and it was expressly laid down that these should be of the same material and colour for all. The colour remains unknown. At this time the national colour was white, and in Edward III.'s reign we find our troops in France clad in white emblazoned with the red cross of St. George. It was laid down in the "Ordinance made by Richard II., Anno 1386, for the Government of the Army," that every English soldier "should beare a signe of the armes of St. George, large before and behynde," on his apparel. The Welsh "medici" were probably the first army surgeons to wear the King's uniform.

From numerous entries in the Wardrobe Accounts of Edward the Second, we learn that it was the custom to send soldiers disabled in the King's service to a religious house, as to a hospital, to be there supported either for life or until they were well. This was called "having *garisona* in a monastery."

In the "Roll of Persons at the Siege of Calais," one of the Harleian Manuscripts, only one surgeon is named and he was part of the retinue of the Black Prince.

EDWARDUS WALLIE PRINCEPS.

Princeps	...	...	...	...	...	1
Banneretti	...	...	...	...	...	11
Milites	...	...	...	...	...	102
Armigeri	...	...	...	...	...	264
Sagittarii equites	...	...	...	...	...	384
Sagittarii pedites	...	...	...	...	...	69
Capellani	...	...	...	...	...	1
Chirurgii	...	...	...	...	...	1
Vexillarii	...	...	...	...	...	5
Vinari	...	...	...	...	...	25
Pedites	...	...	...	...	...	480
Clamatores (or Cryers)	...	...	...	...	...	1
Total						<u>1,844</u>

This surgeon was John Ardern, or Arderne, who was at the time of the French war advanced in years. He was the most eminent English surgeon of his time, and several advances in surgery were due to him. He lived at Newark, near Nottingham, from 1349 to 1370, and then went to London. A large number of his manuscripts are in the British Museum. He was a great favourite of the Black Prince, who gave him a grant of land in Connaught. His patients included many of the most eminent soldiers of the time. He wrote two important works "*Liber de Fistulæ*," and "*De Arte Medicinæ*." He operated for fistula in ano and greatly improved the methods of trepanning. He is said to have added the central pin to the trepan. He was also an historian, and is quoted as the authority for the account of the adoption of the three ostrich feathers as the Prince of Wales' crest.

Very little is known about the arrangements for the care of the sick and wounded during Edward III.'s campaigns. His transport was well attended to, for his army in France had a transport train consisting of 6,000 waggons, stretching two leagues. Some of this was possibly utilised in the carriage of the sick and wounded, but it is more probable that they were sent to neighbouring monasteries. With regard to the severely wounded, it appears to have been usual for his comrades to put him out of his pain. After the Battle of Poitiers "such of the meaner sort of soldiers whose wounds seemed to require a considerable time for cure were by the general dismissed with a small pecuniary provision to carry them home."

In the military establishment of the year of the same reign, as given in the accounts of Walter Wentwaght, treasurer of the household, Grose says, "there is one surgeon for the King's household troops; four physicians and one surgeon for the army of North Wales; two physicians and one surgeon for that of South Wales—a number by no means sufficient for the number of men to which they were appointed." To account for the small number of surgeons employed, Grose suggests that, "the inferior surgeons, stiled barbers, were taken from the ranks and therefore paid and mustered as private men." In the twenty-first year of the same reign, Walter Wentwaght's accounts contain a list of "*Rates and Wages of Warre by the Daie*." From this we learn that the King's surgeons received, "every man by daye. . . 1s."; and "surgions of Welshmen" received 4d. a day pay. Twelve years

later, the Patent Rolls inform us "Richard de Wye is appointed the King's surgeon for life, with twelve pence daily wages, and eight marcs per annum." There is reason to believe that about this time it became usual to engage surgeons to attend soldiers on active service. Their engagement was limited to the period of hostilities or for a particular service. These surgeons received 4d. a day, and they also enjoyed the privilege of shaving the men and receiving from each soldier 2d. on pay day "as regards." This custom of receiving 2d. from every soldier on pay-day continued for a very long period, for it was in existence over two hundred years later.

The most eminent French surgeon of his time published a work on the healing of wounds in 1363, in which he gives a classification of the surgeons of his time. This surgeon, Guy de Chauliac, writes "There are five sects of surgeons; the first follow Roger Rowland, &c., and apply poultices to all wounds and abscesses; the second follow Brumis and Theordoric, and use wine only; the third follow Saliceto and Langfranc, and treat wounds with ointments and soft plaisters; the fourth are Germans, who attend to the armies, and promiscuously use charms, potions, oils and wool; the fifth are old women and ignorant people, who in all cases have recourse to the saints."

We next meet with the surgeon on active service in the reign of Henry V. That king was about to enter upon the campaign of Agincourt, and engaged "Mr. Nich. Colnet, phisitian, to serve him for one whole year, in the voyage then to be made (A.D. 1415), either to the Duchy of Guyenne or to France. He was to bring with him three archers. If the expedition went to Guyenne, he was to have for his own wages 40 marks, and 20 marks for each of his archers for the whole year; if to France, for his own wages, 1s. and for each of his archers 6d. a day, with regards." By indenture, dated April 29, 1415, Henry also engaged Thomas Morestede* and William Bradwardyn as surgeons. Morestede was designated King's surgeon, and agreed to attend himself and provide fifteen persons, of whom three were to be archers and the others "hommes de son mestier." Nearly a month later he petitioned for an allowance of money to provide necessaries for his office, and a proper

* Morestede was Sheriff of London in 1436, and Surgeon to Henry IV., Henry V., and Henry VI.

number of assistants and carriages. The king granted him twelve persons and "one chariot and deux somers." Morestede was to be paid as a man at arms, 12d. by the day, and his twelve assistants and three archers each 6d., with the usual regards. One shilling a day was also the pay of an esquire in the same expedition. These head men (Colnet and Morestede) each got a quarter's pay in advance; and that they might always have security for the next quarter, the King engaged to put into their hands, by way of pledges, as many jewels, as well as other articles, as might be equal to one quarter's pay and subsistence. They were also entitled to hold prisoners to ransom and to plunder. If, however, the booty exceeded twenty pounds they were to give up one third to their kingly master. This was in accordance with the Ordinance of Richard II., which laid down "also that everi man paie the third part of his wynnyges to his lord and master." Morestede was also directed to take with him "as many artisans as were needful to make certain surgical instruments which were required." Many of the surgeons and artisans are said to have been pressed men. In the following year Henry issued a writ to Morestede and Bradwardyn worded thus: "Know ye that we have appointed to you, conjointly and severally, surgeons and other workmen, to take and provide without delay for the making of certain instruments necessary and fitting for your mystery, such as may be required for our present campaign beyond the sea."

The actual medical staff which started on the expedition was, according to the list in Nicholas' "Agincourt":—

"Mr. Nich. Colnet, Phisitian, with three archers.

Thomas Morestede, and	} Surgeons,	{ each with nine more surgeons,	} 20 men."
William Bradwardyn,			

In the list of Henry V.'s army of 32,000 men, we find mentioned "miners, gunners, armourers, painters, pavilion men, surgeons, grooms, purveyors, smiths, saddlers, &c." According to the military code, drawn up at Mans by Henry V., to ensure discipline in the army, the classes of persons subject to the constable included, in order, "soldiers, shoemakers, tailors, barbers, physicians and washerwomen."

■ The strength of Henry's army at Agincourt is estimated by Henry's chaplain, Elmham, to have been 900 men at arms, and 5,000 archers. Monstrelet says: 2,000 men at arms, and 15,000

archers. The latter authority says the French numbered 150,000 men, and again, that there were six Frenchmen to each Englishman. The French lost 10,000 men in the battle; the English lost 1,600. On the morning after the battle, those prisoners who were not likely to recover from their wounds or who were not worth holding to ransom, were slain by the English. Shakespere says this was done owing to a false alarm that the French had been reinforced and were about to renew the attack. Fifteen surgeons were present at Agincourt.

We read that, at the Siege of Harfleur, just before the Battle of Agincourt, five thousand men became sick with dysentery and were sent back to England. A passage in a contemporary account of the campaign appears to show what was done with the sick when the army was on the march through the enemy's country. Thus we read that when Henry V. was marching towards Agincourt he came to Boyes, where a strong castle was held by the enemy. An agreement was made with the captain of the castle that the English should have free passage, and the English stayed in the village for the night. Next day the army resumed its march, and St. Remy, who was present, says: "the King of England had two gentlemen of his army very ill, whom he delivered to the said captain, and was to pay for their ransome, a horse for each." In other words the enemy took charge of the sick, agreeing to give them up on their recovery, if a ransome already agreed upon was paid.

Edward IV. came to the throne in 1461, and appointed William Hobbes to be his physician and surgeon. Grose quotes a manuscript which tells us that, amongst the different persons who engaged to serve the King in Normandy and France in the fourteenth year of Edward's reign, were the following physicians and surgeons:

Master Jacobus Fryle, King's Physicion, 2s. per diem, with two servants at 6d. per diem.

Master William Hobbis, Physician and Surgeon of the King's body, 18d. per diem.

Richard Felde	}	Surgeons every one at XIIId. per diem.
Richard Elstie		
John Smith		
Richard Brightmore		
Thomas Colard		
Richard Chambre		
Symon Coll		

William Coke	}	Other surgeons, every one at VI <i>d.</i> per diem, for their attendance in the said service beyond sea.
William Smythys		
John Stanley		
John Denyse		
Alexander Lidell		

This is an interesting list, for it shows us that there were four different rates of pay in the medical staff at this time, and two ranks of surgeons below that of the King's surgeon.

The Wars in France, and the Wars of the Roses, must have afforded great scope for the exercise of the professional abilities of the army physician and surgeon, but strange to say, the historical records of the period have not thought it necessary to mention them or their work. The same remark applies to the reign of Richard III.

Attempts had been made to control the practice of medicine and surgery. A guild of surgeons appears to have existed in London previous to 1369, and in 1423 an attempt was made to form a faculty of physicians and surgeons. The Company of Barber Surgeons was incorporated in 1461, and in 1492, "in the time of Hewe Clapton, Mayr.," King Henry VI. granted them arms.

In some instances pensions were granted to old soldiers who had been disabled by wounds in war. Thus it is recorded in the Parliamentary Rolls, 4th Edward, A.D. 1464, that "an annuity of four marks is given to John Sclatter for the loss of his hand at the battle of Wakefield, when under the command of the Duke of York, and his other hand so maimed that he could neither clothe nor feed himself."

Towards the end of the fifteenth century venereal disease first made its appearance in Europe. Introduced by Spanish soldiers in 1494, it rapidly spread to Naples, France and Germany. It reached Scotland in 1497, where its ravages were so great that James IV., that "cunning chirurgion," issued a proclamation ordering those who were afflicted to go to the Island of Inchkeith, on pain of being branded on the cheek and being banished for three years.

**SECOND ANNUAL REPORT OF THE PASTEUR INSTITUTE
OF INDIA, KASAUJI, FROM AUGUST 9, 1901, TO
AUGUST 8, 1902.**

BY LIEUT.-COL. D. SEMPLE.

Royal Army Medical Corps, Director of the Institute.

I.—STATISTICAL SUMMARY.

THERE were 543 patients treated during the year under review, as compared with 321 cases treated during the first year. For statistical purposes these may be divided into three classes :—

Class A.—Those bitten by animals proved to have had rabies, either experimentally or by the development of the malady in other persons, or other animals bitten by them.

Class B.—Those bitten by animals certified by a veterinary surgeon to have had rabies, after examination, either before or after death, or both.

Class C.—Those bitten by animals suspected of rabies.

Each of these classes is again divided into three sub-classes :—

Sub-class I.—Those bitten on the head or face.

Sub-class II.—Those bitten through the exposed skin on any part of the body other than the head or face.

Sub-class III.—Those bitten through the clothing.

TABLE I.—*The Numbers in the different classes and sub-classes, together with the percentage of failures in each division, are given in the following tabular statement, which includes Europeans and Natives.*

CLASSES	SUB-CLASS I. Bitten on the head or face			SUB-CLASS II. Bitten through the exposed skin on any part of the body other than the head or face			SUB-CLASS III. Bitten through the clothing			TOTALS		
	Treated	Failures	Per cent. Mortality	Treated	Failures	Per cent. Mortality	Treated	Failures	Per cent. Mortality	Treated	Failures	Per cent. Mortality
CLASS A.—Bitten by animals proved rabid	15	0	0	144	3	2.08	19	0	0	178	3	1.68
CLASS B.—Bitten by animals certified rabid	3	0	0	81	0	0	10	0	0	94	0	0
CLASS C.—Bitten by animals suspected rabid	22	0	0	202	2	0.99	47	0	0	271	2	0.73
	40	0	0	427	5	1.17	76	0	0	543	5	0.92

The above table shows five failures out of a total of 543 persons treated, or 0·92 per cent. All five cases were natives. In addition four patients (three natives and one European*) contracted hydrophobia within fifteen days after the last inoculation, and two patients (both natives) during treatment. These six cases are not reckoned as failures, owing to the fact that their nerve centres became invaded by the virus of the animals which inflicted the bites before treatment was completed.

In these persons the object of treatment was defeated before its completion, or, in other words, before they could be rendered immune against hydrophobia. The proof that these were late cases and not failure of treatment is based on the results obtained from experimental rabies in animals.

As regards the classes of the population, the numbers are :—

I.—British Army 120

Officers, 18 ; officers' wives, 2 ; officers' children, 3 ; N.C.O.'s and men, 84 ; soldiers' wives, 5 ; soldiers' children, 8.

Of these one hundred and twenty patients, 60 were bitten by animals proved rabid ; 18 were bitten by animals certified rabid ; 42 were bitten by animals suspected rabid.

All the British Army patients came under treatment very early, and with the result that there was not a single casualty amongst them.

II.—Native Army 32

Of these thirty-two patients, 21 were bitten by animals proved rabid ; 1 was bitten by an animal certified rabid ; 10 were bitten by animals suspected rabid.

III.—European Civilians 95

Of these ninety-five patients, 26 were bitten by animals proved rabid ; 34 were bitten by animals certified rabid ; 35 were bitten by animals suspected rabid.

IV.—Native Civilians 296

Of these two hundred and ninety-six patients, 71 were bitten by animals proved rabid ; 34 were bitten by animals certified rabid ; 184 were bitten by animals suspected rabid.

Of the European Civilians, sixteen were Government servants, and of the Native Civilians fifty were in Government employ.

* The European referred to above was a lady in a delicate state of health (seventh month of pregnancy), very severely bitten on the upper lip, nose and cheek, and who came late for treatment.

TABLE II.—*European Statistical Table.*

CLASSES	SUB-CLASS I. Bitten on the head or face			SUB-CLASS II. Bitten through the exposed skin on any part of the body other than the head or face			SUB-CLASS III. Bitten through the clothing			TOTALS		
	Treated	Failures	Per cent. Mortality	Treated	Failures	Per cent. Mortality	Treated	Failures	Per cent. Mortality	Treated	Failures	Per cent. Mortality
CLASS A.—Bitten by animals proved rabid	9	0	0	63	0	0	14	0	0	86	0	0
CLASS B.—Bitten by animals certified rabid	2	0	0	43	0	0	7	0	0	52	0	0
CLASS C.—Bitten by animals suspected rabid	7	0	0	47	0	0	23	0	0	77	0	0
	18	0	0	153	0	0	44	0	0	215	0	0

TABLE III.—*Native Statistical Table.*

CLASSES	SUB-CLASS I. Bitten on the head or face			SUB-CLASS II. Bitten through the exposed skin on any part of the body other than the head or face			SUB-CLASS III. Bitten through the clothing			TOTALS		
	Treated	Failures	Per cent. Mortality	Treated	Failures	Per cent. Mortality	Treated	Failures	Per cent. Mortality	Treated	Failures	Per cent. Mortality
CLASS A.—Bitten by animals proved rabid	6	0	0	81	3	3·7	5	0	0	92	3	3·26
CLASS B.—Bitten by animals certified rabid	1	0	0	38	0	0	3	0	0	42	0	0
CLASS C.—Bitten by animals suspected rabid	15	0	0	155	2	1·29	24	0	0	194	2	1·04
	22	0	0	274	5	1·83	32	0	0	328	5	1·52

I believe every caste in India was represented amongst the native patients treated. In the case of twenty persons who presented themselves for treatment, it was found from the information elicited that treatment was not necessary. These are not reckoned in the numbers given above, as they were not treated.

TABLE SHOWING THE NUMBERS COMING FOR TREATMENT EACH MONTH
DURING THE YEAR.

Months 1901.				Europeans	Natives	Totals
August 9 to 31 ...	...	...	...	13	44	57
September ...	...	...	...	20	20	40
October ...	...	...	...	11	15	26
November ...	...	...	...	16	23	39
December ...	...	...	...	19	15	34
1902.						
January ...	...	...	...	10	19	29
February ...	...	...	...	16	35	51
March ...	...	...	...	13	50	63
April ...	...	...	...	20	20	40
May ...	...	...	...	26	24	50
June ...	...	...	...	21	25	46
July ...	...	...	...	24	33	57
August 1 to 8 ...	...	...	...	6	5	11
				215	328	543

The animals which inflicted the bites were—

Dogs ...	...	...	...	...	436 cases
Jackals ...	...	...	...	...	98 „
Horses ...	...	...	...	...	5 „
Cats ...	...	...	...	...	3 „

In addition to a combined statistical table, I have given separate tables for Europeans and natives.

In comparing these tables, it will be seen that the results of treatment have been more successful with Europeans than natives.

The European results are extremely good and could not be improved upon. The native results, on the other hand, are not quite so good, but still they are as good as could be expected, when several factors connected with the circumstances under which a large number of them presented themselves are taken into consideration.

(1) The native patients (owing to their scanty clothing) were, generally speaking, more severely bitten than the Europeans. Many of them were severely mauled, their wounds being deep and numerous.

(2) A large number of them were bitten by jackals.

(3) Many of them wasted valuable time before coming for treatment.

(4) In only a few of the native cases was cauterisation applied early and efficiently.

(5) In a considerable number of cases the wounds were suppurating and neglected on arrival for treatment.

In the treatment of Europeans these factors are hardly ever met with, but with natives they are the rule and not the exception. Some of these factors are capable of being eliminated. There ought to be no reason why native patients (especially those who have access to European medical advice) should not come as early for treatment as Europeans. The very great importance of early treatment cannot be too forcibly impressed upon persons bitten by rabid animals, especially if the bites are multiple or severe, or situated on the head or face.

Early treatment is the keynote to successful results. Head and face cases should, if possible, come under treatment by the third day, and all other cases by the fifth day (if earlier so much the better). The expense connected with the railway journey is probably a most important factor in preventing poor natives from coming early, and no doubt it prevents numbers of them from ever coming at all. It would certainly be a great boon to the poorer class of native patients, and would at the same time induce them to come early and in greater numbers, if the railway companies in India granted them a free pass to and from Kalka, the terminus for Kasauli. A certificate from a medical officer to the effect that the case was a suitable one for treatment at the Pasteur Institute would prevent this privilege from being abused. I believe that concessions of this kind are given by the railway companies in France to the poorer class of Pasteur patients in that country.

Bites from rabid jackals require more rigorous treatment than rabid dog bites. This point was clearly demonstrated during the past year, as most of the casualties in this report took place in a batch of thirty-five jackal cases treated in August, 1901. These cases were treated the same as dog bites of an equal severity, and with results which would show a death-rate of over 11 per cent. After this experience jackal bites were treated on a different system and by a more intensive method than dog bites. Out of the sixty-four cases so treated there has not been a single death, a result which justifies the continuance of a rigorous line of treatment for jackal bites as compared with dog bites.

II.—A FEW FACTS ABOUT “FIRST-AID TREATMENT” WHEN BITTEN BY A RABID ANIMAL.

In last year's report the technique of anti-rabic treatment as carried out at this Institute was described; also the method of attenuating rabies virus, and the preparations of the vaccines, together with the leading facts connected with rabies virus and its mode of infection, were described in detail. On this account these subjects may be dismissed from the present report.

There are, however, a few elementary details connected with what I may term the “first aid treatment” of persons bitten by rabid animals which were not discussed in last year's report, and which I shall now describe, because I believe they are important and useful as far as the general public is concerned. When a person has been bitten by a rabid animal it is most important that the wound or wounds should be attended to at once. Proper attention to the wounds means cauterisation at the earliest possible moment. Pure carbolic acid is the best and least painful application to use. It should be well swabbed into the wound, and then washed out with water immediately afterwards to prevent too much destruction of the tissues. Carbolic acid has the advantage of penetrating into the crevices of the wound, and is not prevented from doing so by the presence of grease or fatty tissues. In addition to its bactericidal properties, the fact that it penetrates into the minutest recesses of the wound is most important.

Crude phenyl does very well, and answers much the same purpose as carbolic acid. It has the additional advantage of being within the reach of most people in India. When applied, the wound should be washed immediately afterwards with water. Caustic potash, caustic soda, and nitrate of silver are also fairly good when well rubbed into the recesses of the wound, but they cause considerable pain. Nitric acid is a very painful application, and burns deep into the tissues, leaving ugly scars. The application of a red-hot iron to the wounds is also a painful proceeding, and leaves a surface which takes some time to heal. Turpentine is also said to be efficacious, but I do not know of any proof to this effect.

Cauterisation if thoroughly carried out within a few minutes of the infliction of the bite will prevent the subsequent onset of hydrophobia in many cases, but not in all. This is the best that

can be said for any form of cauterisation. The object aimed at is to get rid of all the virus which the rabid animal has implanted in the wound, and failing this, to get rid of as much of it as we possibly can. Cauterisation destroys the virus *in situ*. In case there is nothing else at hand, it is better to wash the wound with water than to do nothing at all. If the washing is done early a certain amount of virus is sure to be washed out. An antiseptic lotion is better than water, and the stronger it is, so much the better.

After the bite from a rabid animal the time which elapses before the onset of hydrophobia depends greatly on the amount of virus implanted in the wound. The smaller the amount of virus the longer the incubation period. If cauterisation cannot be relied upon by itself to prevent the disease, it at least destroys some of the virus *in situ* and ensures a longer incubation period, and consequently gives more time for treatment to be carried out at a Pasteur Institute.

It is said to be beneficial up to twenty-four hours after the infliction of the bite, but it is very questionable whether it does any good after eight to ten hours. It is probably not much good after three to four hours, and it is certainly no good after twenty-four hours. There is only one rule to observe as regards time, and that is, the sooner the better.

It is a mistake to put on a ligature above the wound when situated on the limbs, and in my opinion it is also a mistake either to suck the wound or excise them. Owing to the fact that the virus infects the nerves, the application of a ligature cannot possibly prevent this, or do good in any way.

When a person sucks the wound there is always the possibility of some virus from the wound infecting the lips or gums. There would be no danger of infection in sucking the wound provided the lips and mouth were absolutely sound, but this is not always the case, on account of decayed teeth and cracked lips. In excision there is always the danger of the virus in the original wound infecting the larger wound made by excision.

III.—PRECAUTIONS WHICH SHOULD BE TAKEN WHEN A PERSON IS BITTEN BY AN APPARENTLY HEALTHY DOG.

It will be gathered from the preceding remarks that the proper course to pursue when bitten by an animal known to be rabid,

is to have the wound cauterised at the earliest possible moment, and then take the first available train for a Pasteur Institute. When bitten by an apparently healthy dog the method of procedure is somewhat different, and for the following reasons :—

A.—For two or three days before a dog shows any apparent symptoms of rabies his saliva contains rabies virus, and consequently his bites are capable of transmitting the disease.

B.—In exceptional cases the saliva may be infective for as long as seven, eight, or nine days without any apparent symptoms of rabies. These are facts to be remembered when one is bitten by any dog, no matter how healthy he looks. The practical application of these facts suggest the following precautions :—

(1) When bitten by an apparently healthy dog, have the animal tied up and kept under observation for ten days from the date of the bite. If at the end of that time the dog is still healthy the person bitten has nothing whatever to fear as regards infection, even should the animal develop rabies at any time after the ten days. Under no conditions could the saliva of a dog be infective and the animal remain alive and well for ten days afterwards. It is very evident that it would be a mistake to destroy a dog immediately after it has bitten anyone, because then all information regarding his condition would be cut away, unless a small portion of his brain was sent in glycerine to a Pasteur Institute for experimental purposes. The experimental test takes fourteen days at least, possibly eighteen or twenty days. Unfortunately, the microscopic tests cannot as yet be relied upon to diagnose a rabid brain or cord in all cases.

(2) Should the dog under the above circumstances show signs of rabies within the ten days, the person bitten should proceed to a Pasteur Institute for treatment immediately the animal shows the first symptom. On the other hand, should the dog only commence to show symptoms on the eleventh or twelfth day after inflicting the bite (or on any later date) the person bitten would not require to be treated.

(3) A person severely bitten on the head or face by an apparently healthy dog would not be justified in waiting ten days to know whether the animal had rabies or not before undergoing Pasteur treatment. A delay of ten days or even four or five days in a case of this kind might be disastrous, as it then might be too late for successful treatment. Under these circumstances the

safest course to pursue would be to commence treatment, and as soon as it became evident that the dog was not infective, stop it. A person bitten by an apparently healthy dog on any part of the body other than the head or face, could afford to wait in order to see what happened to the animal when tied up for ten days, because the chances are, in the very early stages of the disease, before symptoms became apparent, there would be very little virus in the animal's saliva.

(4) A bite from any dog should be cauterised at the earliest possible moment, no matter what the animal's condition appeared to be.

IV.—MISCELLANEOUS POINTS CONNECTED WITH RABIES.

I have found it necessary to enter into the subject of the cauterisation of wounds inflicted by rabid animals, and the precautions to be taken when bitten by apparently healthy dogs, simply because during the past year I have been plied with numerous questions on these subjects. For the same reason there are a few more points connected with rabies which require to be explained.

(1) The earliest period at which a man or animal bitten by a rabid animal could possibly show any symptoms of hydrophobia or rabies would be fourteen days after being bitten, and probably not sooner than three weeks, and this only in exceptional cases. It could only be fourteen days provided the rabid animal implanted the virus on the surface of the brain of the man or animal bitten, which is almost an impossibility. The incubation period of the "virus of the streets" (dogs', jackals' and wolves' virus) when inoculated on the surface of the brain is fourteen days as a rule. In exceptional cases it may be a few days more or less.

When the bites are situated on the head or face the incubation period is more than fourteen days. When the bites are situated on other parts of the body the incubation period is longer still. When the bites are slight, and only a small amount of virus implanted into the wounds, the incubation period may be several months.

The nearer to the brain the wounds are situated the shorter the incubation period, and it is shortest of all when the virus is put directly in contact with the brain. In addition to the wounds being near the brain, there are also a few more factors which assist

in reducing the incubation period, viz., very deep and multiple wounds, and wounds inflicted on parts of the body where nerves are numerous. Rabies virus prefers to grow in nerve tissues, and it only gives rise to rabies when it multiplies in the nerve centres (brain and spinal cord). It reaches the nerve centres by growing along the nerves from the seat of the bites. These facts explain why it is that bites on the head and face, or deep and multiple bites on other parts of the body where nerves are plentiful, must always be looked upon as serious. Cases of this kind require rigorous and early treatment in order to save them.

(2) During the past two years I have received numbers of letters from people bitten by mad dogs, asking me how long they could with safety put off treatment, their excuse being that they were so busy then that they could not possibly come. My answer has always been by a telegram, which generally settled the question of any further delay. Others have written to me more or less to the following effect: "I have been bitten by a mad dog last week" (or a few days ago, as the case may be), "the wound has healed up, and I feel no bad effects; is there any necessity for treatment?" Judging from these letters it is very evident that the general public require to be enlightened on the very great importance of early treatment, and also on the fact that the bite from a rabid animal heals as quickly as the bite from a healthy one, and is not likely to be followed by any bad effects until symptoms of hydrophobia set in. The appearance of the bite and its disposition to heal, or otherwise, is no index whatever as to whether it was inflicted by a rabid animal or not.

(3) The foregoing facts also apply to dogs and other animals when bitten by rabid animals. A dog bitten by a rabid dog or jackal is quite safe for a fortnight at least, or probably three weeks. The most likely time for rabies to develop would be between the third and fifth week. Two months would cover the incubation period in most cases. Some would go on until three months, and in exceptional cases for six months or longer.

Not more than 60 or 70 per cent. of dogs bitten by mad dogs develop rabies. The percentage of rabies cases would be higher after the bites from rabid jackals—about 85 per cent. These facts would suggest the precautions to be taken when a valuable dog is bitten by a rabid dog or jackal, also the chances of his escape from rabies. Unless a dog is a valuable one, and worth the trouble

of keeping him tied up for from three to six months, the safest plan would be to have him destroyed. There is always a risk to both the owner and his neighbours in keeping infected dogs under observation for such a time.

V.—WORK DONE DURING THE YEAR IN ADDITION TO ANTI-RABIC TREATMENT.

In addition to anti-rabic treatment, a considerable amount of general bacteriological work and research in connection with diseases peculiar to India have been carried out during the past year. Specimens for bacteriological examination and diagnosis from cases of illness were received from all parts of India, and in every case the examination was carried out as thoroughly as possible, and the results communicated to the medical officers who sent them. Every possible assistance and facilities were given to medical officers who came to work at the laboratory, and improve their knowledge in bacteriology.

(1) Serum diagnosis from samples of blood was carried out in 282 cases, viz. :—

(a) One hundred and thirty-nine cases for typhoid fever, with a positive result in thirty-nine, and a negative result in a hundred.

(b) One hundred and forty-three cases for Malta fever, with a positive result in one hundred and four, and a negative result in thirty-nine.

(2) Forty-seven samples of blood were examined for malarial parasites, with a positive result in twenty-six and a negative result in twenty-one.

(3) Eighteen samples of sputum were examined for tubercle bacilli, with a positive result in seven and a negative result in eleven.

(4) Twenty specimens were examined for plague bacilli, with a positive result in nine and a negative result in eleven.

(5) Thirty-eight samples of water were analysed.

(6) Four specimens of tumours were examined and a diagnosis given in each case.

(7) Nine specimens were examined for diphtheria bacilli, with a positive result in five and a negative result in four.

(8) Thirty other specimens of a miscellaneous nature, including samples of first field dressing, vaccine lymph, surra blood, pus, &c., were examined, and a diagnosis or opinion given in each case.

(9) One hundred and six samples of the brain or spinal cord from suspected rabid animals were tested. Of this number eighty gave positive results and twenty-six negative.

(10) Anti-typhoid vaccine was prepared and sent out for 4,000 cases.

(11) Twenty-one officers of the R.A.M.C. and I.M.S. received instruction in general bacteriological work.

(12) The preparation of anti-venene has been commenced, and the serum will soon be ready for issue. I have tested its curative properties on animals, and with the result that it is now quite as strong as the serum prepared at Lille.

(13) Researches in connection with improvements in anti-rabic treatment have been undertaken, and especially with a view to the more successful treatment of late cases.

(14) Investigations connected with Surra (a disease which infects horses, mules and camels) have also been undertaken, more especially with the object of obtaining a curative remedy for this disease.

(15) Anthrax vaccine has been prepared, and can now be sent to any part of India when required. The preparation of this vaccine necessitated a prolonged series of experiments in order to obtain cultures of anthrax bacilli of the requisite degrees of attenuation. Ponies and sheep inoculated with this vaccine have withstood the subsequent inoculation of virulent anthrax taken direct from the spleen of a horse immediately after death from anthrax.

In conclusion, I beg to tender my best thanks to those who have so ably assisted me during the past year.

Capt. W. S. Harrison, R.A.M.C., has been assisting me since July, 1901. Much of the success of the past year has been due to the valuable help I have received from him. He has freely devoted his time and energies in mastering every detail connected with the work carried on at the Institute, and has been most careful and unremitting in his attention to every duty required of him.

Capt. G. McL. C. Smith, I.M.S., has been assisting me since April, 1902. His services have been of much value to me in taking a great deal of extra duty off my hands.

Assistant Surgeon C. J. Fox, I.S.M.D., has worked with me since June, 1900 (two months before the Institute was opened). Mr. Fox is an able and energetic assistant. He has a perfect know-

ledge of his work, and has carried out the miscellaneous duties entrusted to him with tact and care.

Hospital-Assistant Nanak Chand has worked at the Institute since July, 1900. He is a careful and zealous worker and I have found him a very useful and trustworthy help.



Editorial.

MILITARY MEDICAL JOURNALISM.

THE issue of our first number last month has suggested inquiries from several correspondents as to what extent medical journalism prevails among the armies of civilised powers. An interesting article upon this subject appeared in May of last year in the *Journal of the Association of Military Surgeons, U.S.A.*, to which we are largely indebted for information. In that article emphasis was laid legitimately on the fact that England stood alone as the one country without a journal devoted to military medicine. The only representative in this sphere of journalism which Britain could claim, before our own recent appearance, was our flourishing contemporary, the *Indian Medical Gazette*, which, edited by officers of the Indian Medical Service, and not professedly a Service journal, has for many years furnished us with an interesting and valuable series of papers directly connected with our branch of medical science.

Omitting ourselves, the youngest military medical journal is that of the Association of Military Surgeons of the United States Army, which, though really the descendant of the Association Transactions, only assumed its present monthly form in 1902. The previous year had seen the appearance of the French paper, *Le Caducée*. This bright and vigorous fortnightly journal has made marked progress, and though non-official, is always full of matters interesting to Service men of all nationalities. Other French papers of this kind are the *Archives de Médecine et de Pharmacie Militaires* and the *Archives de Médecine Navale*. The former is quite an old paper, tracing its pedigree to as far back as 1815; it is published by order of the French Minister of War. The other, issued under the orders of the Minister of Marine, is of later date, and equally vigorous.

In Germany, the Army Medical Service is represented by the *Deutsche Militärärztliche Zeitschrift*, which has been in existence since the Franco-German War. It is somewhat official, issued monthly, and devotes much space to official orders and notifications. A subsidiary German publication is *Das Rothe Kreuz*, devoted entirely

to first-aid work. The organ of Austrian military medicine is the *Militärarzt*, appearing as a semi-monthly supplement to the *Wiener Medizinische Wochenschrift*; it has been in existence since 1868.

The Italian Army is represented by a monthly called *Giornale Medico del Regio Esercito*, and the Navy by the official *Annali di Medicina Navale*. The Belgian Army is represented by the *Archives Medicales Belges*, which was first published in 1857. In Russia we find what is probably one of the best military medical journals, namely, the *Voyenno Meditsinskii*. We believe this paper was published as far back as 1823. The *Norsk Tidsskrift für Militär Medicin* is published under the direction of the Surgeon-General of the Norwegian Army, and fulfils for Scandinavia what the *Tidsskrift i Militär Hælsværd* does for the military surgeons of Sweden. This is a vigorous journal, and has been published regularly for more than five and twenty years. Even Finland is represented by the *Finsk Militär Tidsskrift*. In Holland, the *Militair-Geneeskundig Tijdschrift* is the organ of the medical officers of the Dutch Army and Navy. This is a quarterly of comparatively recent date, under very able editorship, and devoted largely to tropical medicine. The Spanish Army has two publications, one, the *Revista de Sanidad Militar*, which is really the official organ of the Sanitary Corps, and at the same time of high professional merit; the other is *La Medicina Militar Española*, devoting itself to Colonial or tropical medical subjects.

Among the newer armies of the world, we find a monthly journal devoted to military medicine issued in Buenos Ayres. We have not seen a recent issue, but are informed that it is now in its thirty-fourth year of publication. In a similar manner, the medical officers of the Japanese Army are represented by the typically progressive *Gun Igaku Kwai Zasshi*. Lastly, from Geneva comes the *Bulletin International des Sociétés de la Croix Rouge*. Its title sufficiently indicates the branch of Army work with which it mainly deals.

This summary of the present extent of military medical journalism shows that there are some twenty-two periodicals devoted to this section of medicine. It is true many of them are strictly official, and consequently possess certain advantages as well as disabilities attaching to that position. But, regarded as a whole, they constitute a flourishing section of medical literature.

We, as the latest recruit to their ranks, hope to be no excep-

tion to the general rule, and by worthily chronicling the activities of the British army surgeon, trust to successfully negative the plaint, so long and justifiably made, that our Army was without a literary representative of its medical interests.

THE ETIOLOGY OF TUMOURS.

THE prominence which the question of the causation of cancer has attained in both the professional and lay press suggests certain reflections regarding our knowledge of the etiology of new growths generally. Before the conception of the cellular structure of the organism, a tumour was considered to be a formation foreign to the rest of the organism, or virtually a parasite. It was not until after the publication of Virchow's work in 1850 that it was realised that every tumour consists of cells of the same general character as those composing the normal organism, and that it is analogous to any other formation resulting from the proliferation of cells. While little or no difficulty exists in accepting this conception of the nature of new growths or tumours, it is not so easy to explain what incites cells to indefinite proliferation; and it may be of interest to briefly review the various theories advanced to explain what is the exciting factor in tumour formation.

Thiersch was the first to put forward a theory, and he suggested that tumour formation is due to a lessened resistance of the connective tissue surrounding a group of proliferating cells. His chief argument was that these new growths usually develop in advancing age, or at a time when connective tissue is less resistant. This ingenious theory, however, only explains the occurrence of a limited number of tumours. Cohnheim was the next to advance a theory, which has received considerable acceptance. He held that the excitants of tumours always act upon embryonic cells, which remain, even in advanced age, in certain parts or organs without developing into mature tissues. This view, again, is not sufficient to explain every kind of tumour. Other theories have been put forward, chiefly to the effect that all proliferation starts after a kind of conjugation between a cell and a leucocyte. All these are fanciful, and fail to show what incites these changes. Possibly, the only theory which does do so is the parasitic theory; but not-

withstanding an enormous amount of work having been done to show that parasites are the exciting causes of tumours, all research in this direction has been wanting in success.

If we exclude that of Thiersch, all the various theories put forward have the fundamental idea, originally advanced by Virchow, that there probably exists a nutritive besides a functional stimulus for a cell. To many, the conception that an outside agent could increase the highest characteristic of a cell, its power of proliferation, has been difficult of acceptance. In fact, Weigert maintains that any such outside irritation, so far from inducing a bioplastic process, would rather excite disintegration. These views are shared by Ribbert, who suggests the following hypothesis to explain the proliferation of cells under pathological conditions: "Every cell is able to proliferate. That it does not do so under ordinary circumstances is due to the fact that it forms part of the organic whole, and is restrained by tissue tension. If these influences are removed through the severing of the connections of the cells and the rest of the organism, the proliferating power, hitherto suppressed, manifests itself until the tissue tension is restored. If the severance of cells from their organic connection is complete, and the disconnected cells are not so numerous as to contain a certain tension in themselves, malignant tumours will develop. On the other hand, if the severance is incomplete, and a kind of organic union exists, benign tumours will develop." It is clear from this that the factors exciting cell proliferation act not by a direct influence on the protoplasm, but by inhibiting in some way the restraining influence of the rest of the organism. This hypothesis certainly explains the formation of tumours as well as pathological cell proliferations, and also presents a conception of all the factors of growth and development of an organism. But it assumes as a biological fact that normal cells, unless restrained by the rest of the organism, have the power to proliferate indefinitely. The question naturally follows, is there any evidence in support of this? Ribbert himself partly severed pieces of the ear of a rabbit, and succeeded in producing slowly growing polypous nodules. He also produced tumour formations by transferring parts of the chorda dorsalis to the anterior surface of the intervertebral disc. Work on similar lines by Lubarsch, Garten, and Birch-Hirschfeld, in which pieces of parenchymatous organs were implanted into other organs, resulted in occasional success, as demonstrated by

proliferation and continuance of function ; but for the most part the transferred tissues, after proliferating slightly, degenerated and ultimately disappeared. Later experiments by Levin, in which he tried in a variety of ways to free cells from the restraining influence of the rest of the organism, under conditions most favourable for their subsequent proliferation and production of tumours, have yielded similar negative results.

This work of Levin's (*Journal of Medical Research*, July, 1901) is particularly valuable as showing how impossible it is to support Ribbert's hypothesis experimentally. But, as Levin says, is it really necessary to resort to Cohnheim's, Ribbert's, or any similar theory to account for the formation of tumours? All the facts indicate that, under certain physical influences, the cell may proliferate, no matter whether it is removed from the restraining influence of the other cells of the organ or not. It would be very difficult to explain a compensatory hypertrophy of the heart or kidney on Ribbert's theory. "On the other hand, it seems plausible to assume that cardiac failure or a disease of one kidney changes the general metabolism of the animal so as to produce some substances that stimulate the heart or kidney cells to compensatory proliferation." Levin quotes a very interesting experimental proof of this supposition given by Sacerdotti, who showed that this compensatory proliferation is more energetic if, after the extirpation of one kidney, urea is injected intravenously into the animal. Are we not justified in assuming that a direct influence of some agent on the local tissue cells is a plausible explanation for new formations. Ziegler and Obolenski have given some precise experimental facts to show that certain outside chemical influences may excite a cell to proliferation without changing its position. For instance, poisoning by small doses of arsenic and phosphorus cause proliferation of the epithelial cells of the bile ducts.

The assumption that an extracellular irritant may produce an intracellular bioplastic process finds support in recent researches, notably those in respect of Ehrlich's theory of immunity and the formation of antitoxin. "This theory assumes that every cell consists of a central part and a number of side chains, and that every toxin has an affinity with some certain side chains of some cells. The toxin, once introduced into the organism, combines with such side chains and severs them from the cell, whereupon the latter reproduces the several side chains. The side chains so repro-

duced in some cases exceed the original number, and this excess, freed from the cell, is the antitoxin." It would be difficult to find a better hypothetical example of an external irritant, a toxin causing a cell to reproduce organised parts of its body. The difference between reproduction of a part and forming the whole of a new cell is merely a difference of degree. It is true our knowledge on these matters is still most imperfect ; but a general review of the question compels us to say that just as there is little to explain tumour production by a decreased resistance of connective tissue surrounding the proliferating cells, or by excitation of embryonic cells, so there are no experimental proofs to support the theory that the mere freeing of a cell from the influence of the rest of the organism leads to its proliferation. The weight of evidence suggests that the real excitant of certain cells to proliferation is one which acts as a direct stimulus on those cells. What that stimulant is still remains to be determined.



Review.

DER HITZSCHLAG AUF MÄRSCHEN (Heatstroke on the March). By Dr. A. Hiller. Berlin: Verlag von August Hirschwald, 1903.

Although the author of this book, who is a retired surgeon of the German Army, produces few facts which are not familiar to those of us who have experienced tropical service, still he has succeeded in producing a monograph which cannot fail to be eminently useful to all young officers, as it accurately represents the present state of medical knowledge regarding a subject of the first importance.

Of special interest are Dr. Hiller's own rather original experiments. He starts from the theory that heatstroke is due to excessive heat-production in the body, owing to atmospheric conditions and aggravated by muscular exercise in almost all cases. He then comes to the further conclusion that an almost equally potent factor is the diminution of the body's power of losing heat. Almost the main offender in this aspect, apart from physical disabilities, is the soldier's uniform. This he proved in the following way. He suspended several glass flasks containing water at 44° C. in a room, and subsequently also outside, under various atmospheric conditions. One of these flasks (A) he left entirely uncovered, another (B) he covered with a regulation shirt, a third (C) with a regulation shirt and tunic. He then observed the time it took in each case for the water to cool down to 36° C. He found that in the room C took two hours and a quarter to cool down, as contrasted with just under the hour required for A; B being of course intermediate. Outside, with a slight breeze, the difference was doubled, A and C requiring fifteen and seventy-five minutes respectively. Subsequent experiments revealed the fact that the uniform not only acted as a heat retainer, but also absorbed heat itself. Clinical thermometers fastened in various parts of the equipment and clothing registered temperatures varying from 120° F. to 100° F. Obviously, to cut down the summer clothing of the soldier as much as possible, possibly to provide him with a special summer uniform, is the corollary of these results.

Apart from the matter of clothing, the amount of evaporation that will take place is all important. Here the relative humidity of the atmosphere comes in, and with it a factor which is too often neglected. Men marching in close order exhale and carry with them almost a small cloud of moisture, which must in the end act unfavourably on this power of evaporation. The author therefore strongly recommends that any prolonged march should be carried out in open order.

Finally, of course, the individual characteristics of the men must be considered. Men fresh from hospital, reservists, recruits, all men out of training, in fact, are specially liable, and with them all those with any defect in their circulatory or respiratory systems.

After these preliminary considerations the author reaches the differentiation of the disease into clinical types. Of these he distinguishes three, which he calls respectively: asphyxial, paralytic, and psychopathic. The

prognosis is apparently best in the last named, which deals with nervous manifestation, delirium, hallucination, or even mania. All these are, however, transitory, the patient recovers, and all goes well. Suicidal tendencies have, however, to be guarded against.

More dangerous and most frequent is the asphyxial type. Here the patient is usually found lying on the ground, completely unconscious. His face is pale, earthy coloured, and yet cyanosed. Respiration seems practically abolished, a few sighing and yet shallow breaths being all that are taken. The radial pulse cannot be felt. The heart sounds are rapid and feeble. The skin is dry and hot, and slight muscular spasms are occasionally seen.

Still more ominous is the third condition, when the patient is in a condition of absolute coma, with complete loss of sensation. His face is pale, only lips and ears being cyanosed, and the skin burning hot. The pulse is imperceptible, the heart sounds weak, irregular and rapid, the respiration shallow and rapid, and often assuming the Cheyne Stokes character. The temperature is found to be 104° F. and over. There is usually vomiting and relaxation of the sphincter. The picture is completed by violent convulsions every few minutes, with opisthotonos, and frothing at the mouth. In the intervals the muscles are as hard as wood in intense tonic spasms. Gradually the vital powers fail, the spasms become less frequent and less violent, the fingers become cold, the respiration shallower, and death supervenes.

Of *post-mortem* appearances the condition of the blood is noteworthy. It is of a uniform dark red colour in arteries and veins, and the colour does not become lighter on exposure to the air. The alkalinity is markedly diminished, sometimes the blood is even acid. Finally, there is great destruction of red blood corpuscles, which may fall as low as one million to the cubic centimetre.

As regards prophylaxis, the author is emphatic as to the necessity of weeding out the physically unfit before the march. For this purpose he does not consider the examination of heart and lungs under normal conditions sufficient, but holds that all doubtful cases at least should be made to undergo some test resembling the exertion of the march. He recommends making them march round the barrack square for at least one hour in full kit, and then testing their condition.

For the actual treatment of the case, Dr. Hiller considers the first step should be to commence artificial respiration, as the condition is largely due to asphyxia. He adduces several cases in which this method has had the happiest results. Cooling the skin by stripping the man and fanning him with a tunic, or pouring cold water on him, is the next indication. Should the circulation be very sluggish, venesection will relieve the congestion in the veins and bring relief to the labouring heart. Finally, large rectal injections of normal saline solution will restore to the body the fluid it has lost by excessive perspiration, and help to bring the alkalinity of the blood up to its normal standard.

As regards special symptoms, the convulsions may have to be treated by morphia, or even by chloroform.

J. A. B.

Current Literature.

I.—MEDICINE AND SURGERY.

Herpes of the Ophthalmic Branch of the Fifth Nerve, with Optic Neuritis. Cabannes (*Gazette Hebdom. des Sciences Méd. de Bordeaux*, April 12, 1903) relates the case of a man, aged 30, who was admitted to hospital on January 1 with inflammation of the left eye and side of the face, which began suddenly on December 24, with redness and lachrymation, also pain in the forehead and upper lid on that side. On December 28 the redness, previously confined to the eye, rapidly involved both lids, the left half of the nose, the left side of the forehead, and the anterior and middle of the corresponding half of the cranium. The skin was swollen, tense and shining. Little pruriginous vesicles appeared in confluent groups. The contents were at first lemon coloured or hæmorrhagic, but soon became purulent. On admission erysipelas was diagnosed. The lids were much swollen and glued together by muco-purulent secretion, there was chemosis and the cornea had lost its polish and was a little opaque. The patient did not feel ill, but the temperature several times reached 100.4° . On January 12 the eyes were more completely examined. The left upper lid was red and so swollen that the orbito-palpebral wrinkle was effaced. The conjunctiva showed uniform rosy injection, and there was no longer any chemosis. The internal two-thirds of the cornea was insensible and showed a small diffuse opacity of the size of a lentil. The external third of the cornea was completely transparent and its sensibility was normal. The line of transition between sensibility and insensibility was vertical. The pupil was dilated and immobile, but some days before atropine had been used. In the right eye vision was normal; in the left, light could scarcely be perceived. The left fundus was difficult to examine, not only from the state of the cornea, but also from cloudiness of the vitreous. The optic disc was a little pale and not swollen, the arteries could scarcely be seen, but the veins were turgescient and tortuous, and there were two retinal hæmorrhages. The redness of the forehead had much diminished, and there was brown pigmentation, particularly around the crusts left by the vesicles. The affected region was hyperæsthetic, and formed an area sharply limited by the middle line, and externally by an irregular line running from the external angle of the eye to the parietal region. On January 27 the eye was still red and watery and its tension was diminished; the cornea was completely transparent and showed only slight loss of polish in its internal part. There was already advanced optic atrophy. The disc was very pale, the arteries were much narrowed, and the veins were congested. Cabannes points out the rarity of optic neuritis, unilateral or bilateral, as a complication of herpes zoster. Cases have been recorded by Hutchinson, Bowman, Daguenet and Sulzer. The optic neuritis in the present case resembled that of the acute infections, such as typhoid fever and syphilis, in the early onset of the disease, intense congestion without œdema or marked strangulation of vessels, and hæmorrhages.

The Diagnosis of Epithelioma of the Mouth. Jonathan Hutchinson, jun. (*Practitioner*, May, 1903), discusses the difficulties in the diagnosis of epithelioma which arise from the following facts: (1) In at least 30 per cent. of the cases of epithelioma of the tongue there is a history of syphilis; (2) in perhaps 20 per cent. epithelioma supervenes on tongues that have been the site of chronic syphilitic inflammation; (3) in a minority of cases a diagnosis cannot be made without microscopic examination; (4) the "therapeutic test" is often fallacious; in epithelioma of the tongue improvement may take place under iodides and attention to the hygiene of the mouth; (5) epithelioma has no uniform characters. In nineteen cases out of twenty there is "a growth," a raised hard edge, and often papillomatous projection; yet there may be atrophy of the tongue. The following are the points of differential diagnosis: (1) Gummatous ulcers are frequently situated on the palate, back of the pharynx, and dorsum of the tongue. They are rare on free border of the lips, sides of the tongue, and floor of the mouth. The last three positions are common sites of epithelioma. (2) The induration and projection of the edge are greatest in cancer. The "wash-leather" slough of a breaking-down gumma is very characteristic, but may be simulated perfectly in a septic cancerous ulcer. (3) Shooting pain, especially referred to the ear, is a grave symptom in doubtful ulcer of the tongue. (4) Examination of a scraping from the floor of an ulcer is valuable, but must be done with care. The floor must be thoroughly cleansed and the scraping then made, stained with methyl violet or blue, and examined with a medium power in glycerine or distilled water. If the ulcer be syphilitic, tuberculous, or dental, the scraping will show but little epithelium, and that of the ordinary squamous type with small nuclei. If the ulcer be cancerous, modified epithelium of rounded or oval form, with large, often multiple, nuclei, will be freely present; occasionally cell nests can be detected. The age of the patient affords no help. Epithelioma may occur before 30. The writer has observed epithelioma of the tongue in a girl aged 19, and in a man aged 24, who died from glandular infection. The text-books have made too much of diagnosing by hard and swollen glands in the neck; when such occur diagnosis is useless. Moreover, septic, syphilitic, and tuberculous ulcers of the mouth frequently cause glandular enlargement. In leucoplakia of the tongue the risk of cancer is great; directly localised induration or, still more, papillomatous growth occurs operation is called for. A chronic hard-edged ulcer of the tongue opposite a sharp or carious tooth must be regarded with suspicion. If it does not heal after removal of the exciting cause, Mr. Hutchinson recommends that it be treated as a commencing epithelioma and excised. In the diagnosis of cancer of the mouth the microscope is not infallible, and in the earliest or pre-cancerous stage it is useless.

Primary Pneumococcic Infection of the Puerperal Uterus. A. G. R. Fullerton and W. F. Victor Bonney (*Journ. of Obst. and Gynæcol.*, May, 1903) record the following case. A woman, aged 24, had been delivered with forceps of her first child after a difficult labour owing to contracted pelvis. On the third day the temperature rose, and during the next seven days it ranged between 103° and 105°. The abdomen was tender, and there were vomiting and rigors. On the tenth day the face was haggard

and sallow; the temperature was 105° and the pulse 150. The lower abdomen was tender, and an indefinite fulness could be distinguished there, which was more marked and extended higher on the right side. The lochia was brown and offensive. A perineal laceration was swollen and sloughing. There was a large sloughing laceration of the anterior lip of the os, extending into the anterior vaginal fornix. The outline of the uterus was obscured by considerable pelvic effusion. Death occurred on the fifteenth day. The necropsy showed general injection of the peritoneum, pelvic peritonitis, with matting of the contents of the pelvis, and some coils of intestine in the right iliac region. There were collections of a turbid serous fluid between the adherent coils of intestine. The right broad ligament was thickened by effusion into it. The uterus was in a state of subinvolution, thickened and softened, and in its cavity was a small piece of adherent placenta. There was a lacerated wound of the cervix. The bases of the lungs were congested, but there was no sign of consolidation. A swab, which had been taken from as high in the cervical canal as it could be passed, on the tenth day after labour yielded diplococci with capsules which stained by Gram's method and resembled pneumococci, *Bacillus coli*, and *Staphylococcus pyogenes albus*. On inoculation of mice, pneumococcic septicæmia was produced. The writers think the case was primarily one of pneumococcic infection, and that the other organisms represented casual secondary infection. They regard the infection as primarily one of the genital passages, since there was no evidence of lung infection. They refer to a case of pneumococcic secondary infection of the uterus observed by one of them: a woman, seven and a half months pregnant, was delivered on the second day of an attack of pneumonia and died. The uterus contained brownish fluid, which yielded the pneumococcus in pure culture. Primary pneumococcic infection of the puerperal uterus appears to be rare. Several writers have found the pneumococcus in cases of salpingitis following labour, or secondary to vaginitis.

Phlebitis of Microbial Origin in Chlorosis. P. Sainton and A. Jousset (*Bulletins et Memoires de la Soc. Méd. des Hopitaux*, April 17, 1903) describe the case of an anæmic girl, aged 18, who was admitted to hospital on February 6. A fortnight before she noticed œdema of the right ankle, which was soon followed by pain in the position of the external saphenous vein. There was œdema of the right foot, ankle and calf. On February 13 the right thigh became swollen, its superficial veins were prominent, and the pain was increased. With this extension of the phlebitis the general condition deteriorated. The evening temperature was 101.3° , and there were malaise and anorexia. The blood was very pale, and of sp. gr. 1052. There were 2,300,000 red and 10,000 white corpuscles per c.mm., poikilocytosis, and a hæmoglobin index of 0.62. On February 20 the swelling extended to the abdomen, and the internal and external iliac vessels were tender. Fine varicosities of ecchymotic appearance were seen on the œdematous skin. On February 22 the patient complained of a stitch in the right side, and at the base of the lung behind there were slight dulness and diminished respiratory murmur. On the next day there was a severe attack of dyspnoea, without cyanosis, and she died at the end of half an hour. At the necropsy the thymus gland was found persistent. The thyroid was

small, and weighed only 15 gm., and the aorta was narrow. The right pleural cavity contained 300 gm. of serous effusion. The right ventricle contained *post-mortem* clots, and also a white elongated non-adherent clot. In the pulmonary artery were clots which ramified as far as the smallest branches to the left superior and right inferior lobes. Thrombosis began in the inferior vena cava, 7 cm. above the promontory of the sacrum. It extended through the right external iliac, popliteal, internal saphenous and profunda veins. In the lower part of the femoral veins was suppurative endophlebitis. The spleen was large and diffuent, and weighed 570 gm. The femoral vein and the spleen yielded cultures of virulent diplo-staphylococci. In cases of phlebitis in chlorosis microbes considered to be pathogenic have been found in the blood, but never before in the venous lesion.

Rupture of the Aorta in an apparently Healthy Boy.—This case is reported by Evert Was-astjerna (*Zeitschr. f. klin. Med.*, Bd. xlix, Heft 1, 2, 3 and 4, 1903). An unusually well-developed, athletic boy, aged 13, the son of healthy parents, skated uninterruptedly from twelve to two on December 26, 1902. Suddenly he became pale, sat on the ice, and complained of pain in the cardiac region, palpitation and vertigo. His skates were removed by a companion, with whom, after drinking a glass of water, he tried to walk home. On reaching the shore he could go no further, and was taken home in a sledge. He then, supported by a boy, aged 12, ascended fourteen stairs and went to bed. He ate his dinner, although still suffering from vertigo, palpitation, and headache. He drank large quantities of fluid, and was constantly rising to micturate. During the night he was restless and slightly delirious. On December 27, after a dose of senna, and again on December 28, he walked across a yard, and ascended twenty steps to the closet. At 6 p.m., on December 28, he rose to micturate, and then laid down and talked with his brothers. At 6.30 his expression suddenly became fixed, he took a few deep breaths, and died. The boy had had no illnesses except scarlet fever and measles, but had suffered from frequent attacks of epistaxis, and during the winter from a short hacking cough. The writer saw him soon after death. The cardiac dulness was triangular, and extended beyond the sternum on the right and the nipple line on the left. Thus an intrapericardial hæmorrhage was probable. At the necropsy on December 29, the anterior mediastinum was found to be infiltrated with blood, and the pericardium distended. There were about 7 oz. of a blood-stained serous fluid in the left pleural cavity, and about 17 oz. in the right. The pericardial sac contained a quantity of blood and coagula, which weighed 26½ oz. The heart was slightly fatty, relaxed, and considerably larger than the boy's clenched fist. The ventricles were somewhat dilated. The endocardium and valves were normal. The ascending aorta was greatly dilated with abnormally thin walls. Posteriorly, a few cm. above the semilunar valves, was a shallow saccular diverticulum. Two cm. above the posterior semilunar valve was a small Z-shaped rupture with ragged edges, which involved the intima and media. The adventitia was separated from the media for $\frac{2}{5}$ in. below, $1\frac{1}{2}$ in. to the right of, $\frac{2}{5}$ in. to the left of, and $1\frac{1}{4}$ in. above the rupture. One inch above this rupture was a ragged slit in the adventitia, $\frac{3}{8}$ in. in length, leading directly into the pericardial sac. The cause of the aortic dilatation was a constriction. Just beyond the origin of the left

subclavian artery the aorta narrowed, and the circumference of its interior was only $1\frac{1}{2}$ in.—(at the level of the rupture the circumference was nearly 4 in. (9.7 cm.). From this narrow part, about 1 in. below the origin of the left subclavian artery, three vessels, each about 5 mm. in diameter, were given off. Below these was the origin of a horse-shoe-shaped vessel, which was accidentally cut during the *post-mortem* examination, but which probably communicated with the aorta lower down. Immediately beyond this the aorta was constricted. The descending part of the arch and the descending aorta appeared like two fingers of a glove, the tips of which had been approximated at the constriction. The lumen of the aorta at the constriction admitted a fine probe about 1 mm. thick. The intercostal arteries were somewhat dilated. There were patches of atheroma in the aortic arch, the innominate, the beginning of the right carotid and subclavian arteries, and the aortic above and below the constriction. With such a congenital abnormality the good physical development of the boy was remarkable. It was rendered possible by a good collateral circulation.

Traumatic Œdema.—Under the name *Œdème dur traumatique*, Henri Secrétan (*Revue med. de la Suisse romande*, April 20, 1903) describes the swellings which accompany contusions. A blow may produce ecchymoses without apparent swelling. Such contusions “of the first degree” rapidly disappear. But if there is considerable intra- and subcutaneous extravasation resolution is extremely slow. The swelling, initially soft and elastic, soon becomes hard, and in this condition may persist for months. The seat of election for traumatic œdema is the back of the hands, probably because the hands are more exposed to injury than other parts, and the skin and subcutaneous tissue are compressed against the unyielding metacarpal bones. Traumatic œdema is also common over the metatarsus, but may occur anywhere. Thus a man had the right knee crushed between a block of stone and a wall. Next day there was diffuse œdema on the inner side of the knee, which pitted on pressure. There was no synovitis. The œdema became circumscribed, and formed a hard, prominent swelling of the size of a large pear. Six weeks later, when he was last seen, it was still very obvious. In a second case a man was struck, on October 30, by a stone on the left forearm near the elbow. In addition to some superficial excoriations, there was an effusion in the skin and subcutaneous tissue of the antero-external aspect of the arm, which formed a thick, hard swelling 4 in. long and 2 in. wide. In this case the hard œdema had no relation to the underlying bone. The swelling was still well marked in January, and work was not resumed till the end of February. Since the writer, in 1901, first described hard œdema of the dorsum of the hand he has seen twenty-two cases. Even in the most severe cases radiography showed that there was no osseous lesion. In several the swelling persisted for more than five months. The condition was almost invariably diagnosed as fracture of the metacarpus, and in one case an exploratory incision had been made. The prognosis as regards ultimate recovery is good, except in those cases of “contusions of the third degree,” which are so rare as to be pathological curiosities, in which a blow on the metacarpus produces a permanent cicatricial neoplasm. Sometimes the skin is intact, and the swelling forms a circumscribed tumour, which is situated at the base of the metacarpus,

apparently beneath the tendons. These swellings are to be distinguished from callus and new growths. The chief point of the writer's teaching is that when a patient has traumatic oedema of the back of the hand, it will persist for weeks, if not months.

The Corkscrew in the Treatment of Cranial Depressions of the New-born.—The treatment of severe traumatic indentations of the skull arising intrapartum is discussed by P. Baumm (*Zentralbl. f. Gynäk.*, May 9, 1903). Extreme depressions are always permanent unless rectified. Though not necessarily immediately fatal, they are not infrequently followed by convulsions or other symptoms of cerebral compression, and are in any case a serious deformity. Attempts to force the depression outwards by compression of the sides of the skull almost always fail. Hence, if any treatment has been applied a severe operation has usually been performed. Nicoll (*Glasgow Med. Journ.*, February, 1901) trephined and elevated the depressed bone, and Billard (*Obstetrique*, March to June, 1902) made an incision and introduced a spatula under the depressed bone, which was used as a lever to elevate it. The writer has successfully elevated the cranial bones in four cases by inserting a small corkscrew. The promontory had indented the temporal bone in three, and had produced a comminuted fracture of the frontal bone in the fourth. In the first case attempts were being made at resuscitation, when the idea of a small corkscrew to elevate the depression occurred to the writer. An assistant happened to possess one. A small incision was made in the scalp, the sterilised corkscrew was inserted, and the skull raised without difficulty. The heart's action and respiration improved immediately, but the child eventually died. *Post-mortem* death was found to be due to a large intracranial hæmorrhage, which had no connection with the corkscrew track in the dura mater. In the next two cases the corkscrew was inserted directly through the scalp without previous incision. Elevation was easy. One child recovered, the other died of intracranial hæmorrhage. In the case of depressed fracture there was no difficulty in inserting the corkscrew after incision of the scalp. The bone was raised and the child recovered.

II.—HYGIENE AND PATHOLOGY.

The Hygiene of Acetylene Gas.—The steady increase of the use of acetylene either as a direct illuminant or as an enricher of coal gas, demands a critical study of its hygienic properties. All illuminants, with the exception of the incandescent electric lamp, change the character of the air, either by the consumption of oxygen and undue heating or by giving off products of partial or complete combustion, more particularly carbon dioxide and aqueous vapour. Acetylene gas has been the subject of an elaborate series of experiments from the hygienic point of view by M. Masi, and from the *Annali dell' Istituto d' Igiene dell' Università di Roma* we learn the main results of this work. For purposes of comparison Masi lays down the following rules as to the desiderata of a normal artificial illuminant: (1) It must give a steady light without notable variation or intensity; (2) the character of the light should approach as near as possible to that of the sun; (3) the radiating heat should not cause a notable rise of temperature

in the room ; (4) the illuminant should not give off noxious compounds ; (5) it should not be capable of exploding ; (6) it should be cheap.

To test these various points, Masi carried out his experiments in a special chamber, using three Bray's 00000 burners ; these consumed 18 litres of gas per hour each, and gave a light of 20 candle power. These burners gave a large spreading flame, absolutely white in colour, and only comparable to that yielded by the voltaic arc. As regards heating of the air, Masi placed three thermometers at half a metre, one metre, and one and a half metres from the flame. At the commencement of the experiment the thermometer marked 21.6°C . At the end of an hour the respective thermometers marked 23.7°C ., 21.8°C ., and 21.8°C . Several series of experiments gave practically the same results, thus showing an extremely low ratio of radiation. Masi's observations as to the production of carbonic acid indicate that per 100 candle power, burning for one hour, acetylene yielded 0.283 gramme ; the corresponding figures or amounts of carbon dioxide yielded by other illuminants being : coal gas (Siemen's lamp), 0.386 ; coal gas (Argand burner), 0.882 ; paraffin, 2.29 ; stearine, 2.44. The maximum production of aqueous vapour during one hour of the three acetylene flames was 0.2 gramme. Masi's comparative table is as follows : 100 candle power produces in one hour—coal gas (Siemen's lamp), 0.304 ; coal gas (Argand burner), 0.694 ; paraffin, 0.911 ; stearine, 0.936 ; and acetylene, 0.203 gramme. During the whole course of experiments no traces of ammonia, nitrous acid, sulphuretted hydrogen, or organic substances were found. Acetylene has a greater explosive force than coal gas, but its smell is quite as strong and characteristic, and should act as a sufficient warning to prevent the production of accidents by the introduction of a flame or the striking of a match. It is noticeable that equal quantities of acetylene and coal gas when mixed will not produce an explosive compound ; the mixture will merely burn. As the quantity of air is increased the mixture gradually becomes more explosive, and the maximum point of explosive danger is reached when there is one volume of acetylene to twelve of air. Beyond this point the addition of air gradually diminishes the explosive effect, until, when there is only one volume of acetylene to twenty of air, the mixture is harmless. According to Masi, acetylene is the cheapest illuminant, with the exception of coal gas, when an Auer burner, with incandescent mantle, is used.

The Standardisation of Disinfectants.—A very superficial acquaintance with the routine of sanitary work is sufficient to make it clear that the securing of adequate disinfection is by no means a simple operation. Much of this difficulty arises from the fact that there are a number of preparations in the market, and of considerable popular repute as germicidal agents, which are not only worthless but actually dangerous, since the use of such products gives rise to a false sense of security. It is well known that there exists no official control over the sale of disinfectants, with the exception of those set forth in the Privy Council Orders of July 27, 1900, and June 5, 1902. The first Order permits the sale, without control, of liquids containing less than 3 per cent. of phenol, or its homologues, as disinfectants, on the ground that such a fluid is not a poison within the meaning of the Pharmacy Act, 1868. In the second Order, it is stated that liquid disin-

fectants containing scheduled poisons (which for present purposes are practically carbolic acid, or its homologues, in solutions of more than 3 per cent., and corrosive sublimate) shall be sent out in distinctive bottles. It is clear that these Orders fall little short of placing a premium on inefficiency, and exercise no control over the sale of undoubted efficient disinfectants, such as potassium mercuric iodide and formaldehyde. This anomalous state of affairs is probably due to the absence of an organised system of standardising disinfectants.

An interesting discussion on this subject was opened by Dr. Rideal and Mr. Ainslie Walker at the recent Congress of the Sanitary Institute at Bradford. They suggested that a bacterial, rather than a chemical, determination of efficiency is required, as although the strength of a preparation of phenol and its homologues can be ascertained with accuracy, there are certain analogous preparations, such as creolin, which do not depend on these acids for their germicidal efficiency. They further pointed out that much depends upon the conditions in which the reagent is employed. Thus, a disinfectant containing 10 per cent. of tricresol in emulsion is equivalent in bactericidal value to one containing 30 per cent. in solution, when tested against a fresh culture of *B. typhosus*.

The dominant difficulty is the impossibility of reconciling the values given in any two reports on various disinfectants, and this is due to the fact that no two results obtained by different observers are comparable unless the details of procedure are identical. The more important factors are time, age of culture, reaction of media, temperature, variations in vital resistance of organism used, and proportion of culture to disinfectant. To these must also be added the need of a standard control. The standard recommended is pure phenol, and the strength or efficiency of any disinfectant can be expressed in multiples of carbolic acid performing the same work, the ratio, so obtained, being called the phenol co-efficient.

This question of disinfectant comparative values has been under our consideration both at Netley and in London for some months, and we cordially agree with the views expressed at Bradford; in fact, we may say that, antecedent to the Congress, we, both independently and in conjunction with one of the exponents, have made observations in support of the ideas and proposals put forward. The method of standardising may be briefly described as follows: To 3 cc. of varying dilutions of the disinfectant in sterile water add three drops of a twenty-four-hour-old broth culture of the organism grown at 37° C. Shake these, and from them make sub-cultures every two and a half minutes up to fifteen minutes into a series of sterile broth tubes. Incubate these sub-cultures for forty-eight hours at 37° C., and note the results. Allowing thirty seconds for each act of sub-culture or medication, it is possible to test four different dilutions of the disinfectant under examination, together with a standard control under strictly comparable conditions. The following table shows the results in our hands of applying this principle of testing, in respect of certain well-known preparations, against a stock strain (0) of the *Bacillus typhosus*.

From these results it is apparent that as regards a typical *B. typhosus*, we can say that the phenol co-efficient for the above-named disinfectants are: Izal, 8; Mykrol, 1.3; Zotal, 1.3. When worked out against other micro-organisms, our experience so far indicates that the co-efficients are

not materially different. We are disposed to think that the application of this method may be of great assistance in arriving at concordant results regarding the relative values of different reagents, especially if time of contact be taken as the constant, and strength or dilution as the variant. The matter is now the subject of systematic study, and the final conclusions cannot fail to be of interest and value.

B. TYPHOSUS (0), 24 HOURS' BROTH CULTURE AT 37° C.

REAGENT	DILUTION	TIME IN MINUTES OF EXPOSURE OF CULTURE TO THE DISINFECTANT					
		2½	5	7½	10	12½	15
Izal ...	1 : 900	+	+	+	+	+	+
	1 : 850	+	+	+	+	—	—
	1 : 800	+	+	—	—	—	—
	1 : 750	+	—	—	—	—	—
Mykrol ...	1 : 150	+	+	+	+	+	+
	1 : 140	+	+	+	+	—	—
	1 : 130	+	+	—	—	—	—
	1 : 120	+	—	—	—	—	—
Zotal ...	1 : 150	+	+	+	+	—	—
	1 : 140	+	+	+	—	—	—
	1 : 130	+	+	—	—	—	—
	1 : 120	+	—	—	—	—	—
Phenol ...	1 : 110	+	+	+	—	—	—
	1 : 100	+	+	—	—	—	—
	1 : 90	+	—	—	—	—	—
	1 : 80	—	—	—	—	—	—

The Etiology of Small-pox.—If confirmed, an epoch-marking communication on this subject has been made by Councilman (*Boston Med. and Surg. Journ.*, April 30, 1903) to the Boston Society of Medical Sciences. He and his fellow-workers have been able to demonstrate that certain bodies which for some years have been observed in the epithelial cells of the skin in cases of small-pox are organisms belonging to the group of protozoa. The whole research goes to show that small-pox passes through certain perfectly definite stages in its development clinically, to which correspond definite changes in the form of the causative organism. These changes in form consist first in the appearance in the cell protoplasm of small, homogeneous, structureless bodies, which gradually increase in size coincidentally with the degeneration of the cells in which they lie. With this increase in size the character of these bodies changes, the general outline becomes irregular, with an increasing resemblance to an amoeba. Later, a sporulation-like process sets in, followed by the breaking up of the amoeboid forms into smaller spore-like bodies. This constitutes the first cycle in the life-history of the organism. Up to this stage the nuclei of the epithelial cells show no changes, but now they are penetrated by the spore-like bodies already mentioned. Gradually small ring-shaped bodies become apparent in the nuclei. These slowly increase, fill, and finally destroy the nuclei, until these new bodies become free. The bodies again become more homogeneous, and then assume the ring-shape, finally having a minute central

dot. Councilman regards these final forms as the real infecting agents of the disease. We have thus two cycles of the organism, corresponding in general to the life-history of the protozoa: the first is simple and extranuclear; the second is probably sexual and intranuclear. It is sufficient that vaccinia represents the extranuclear phase of the organism, but that the production of variola is dependent upon the invasion of the nuclei, or intranuclear cycle. The rôle of bacteria is apparently quite subordinate to the organism described, though doubtless streptococci are essential in the development of the disease. Calkin, who is a well-known authority on the protozoa, endorses the view of Councilman, that the organisms observed and described are unquestionably protozoa. Confidence is expressed that in this newly-described protozoa we have the essential etiological factor in the production of small-pox. Similar work, though perhaps less precise, on this subject has been published (*Brit. Med. Journ.*, Jan. 31, 1903, p. 241) by Thomson and Brownlee, which is extremely suggestive and corroborative of the view that we are about to fathom the mysteries of the causative agents at work in small-pox, chicken-pox, and cognate diseases.

The Gametes of Benign Tertian Malaria.—In an interesting article on "Problems of Modern Malarial Research," R. Ruge (*Centralblatt für Bakteriologie*, vol. xxxii., No. 11) describes the development of the gametes of benign tertian malaria, and also the points by which the mature macrogametes and microgametocytes may be differentiated from the segmenting forms of the parasite and from one another. He studied first the mature gametes in specimens stained by Romanowsky's method, and, by working backwards through forms less and less mature, arrived at the conclusion that, even in the youngest ring forms of the parasite, certain differences are to be detected between those which are going to develop into rosettes and those which will become gametes. He found that in the young gamete ring the chromatin lies inside the clear unstained central zone, while that of the young schizont, or asexual form, lies in the substance of the blue-staining protoplasm of the ring itself. He further distinguished in these young gamete rings certain differences in the amount of the chromatin and in the size and colour of the melanin granules, by which he thinks the young macrogamete may be distinguished from the young microgametocyte. The various forms assumed by these gametes during their further development are described and shown to depend upon the direction of the growth of the protoplasm of the young ring either from one side or from both sides of the ring, or, more rarely, by a uniform outgrowth from the whole of the circumference of the ring, thus maintaining the original ring shape. Of greater practical importance is his description of the mature gametes, and of the differences between the male microgametocyte and the female macrogamete. In both sexes the achromatic zone persists, instead of disappearing as is usually the case in the segmenting forms; while, lying in this clear zone, the chromatin mass is found showing no trace of division. The mature microgametocyte possesses a large mass of rather pale-staining chromatin, of circular or oval shape, which may have a diameter of one-half that of the whole parasite. Its protoplasm stains only feebly with the blue element of the Romanowsky stain, and in it stands out clearly the melanin

granules, which are large and of a yellowish brown colour. The mature macrogamete, on the other hand, possesses a much smaller amount of chromatin of a deeper staining reaction, which lies in the clear zone, and only measures from $\frac{1}{8}$ to $\frac{1}{20}$ of the diameter of the parasite. The protoplasm differs from that of the microgametocyte in having a staining reaction similar to that of the segmenting forms, viz., bright blue; the melanin granules are fine and black, and are scattered irregularly over the whole parasite.

The majority of the points brought out by Ruge's careful work in the identification and sexual differentiation of the benign tertian gametes we have been able to confirm in specimens of blood from this variety of fever, taken in countries as widely apart as China, India, the Mediterranean, and the Transvaal, and they should prove of great assistance to those working on such points as the action of quinine on gametes and the infection of mosquitoes. In the latter case it is obvious that mosquitoes cannot be successfully infected unless the blood of the patient whom they are permitted to bite contains a sufficient number of sexually mature gametes of both sexes.—W. B. L.



Corps News.

EXTRACTS FROM LONDON GAZETTES.

ARMY MEDICAL STAFF.

The King has been graciously pleased, on the occasion of the celebration of His Majesty's birthday, to give orders for the following appointments to, and promotions in, the Most Honourable Order of the Bath, dated June 23, 1903.

Surg.-Major-Gen John By Cole Reade, C.B., K.H.S., late Army Medical Staff, to be Ordinary Member of the Military Division of the Second Class, or Knight Commander of the said Most Honourable Order.

Surg.-Gen. George Joseph Hamilton Evatt, Army Medical Staff, to be Ordinary Member of the Military Division of the Third Class, or Companion of the said Most Honourable Order.

Surg.-Gen. Sir John By Cole Reade, K.C.B., K.H.S., entered the Service March 24, 1854. He was appointed Assistant Surgeon to the Rifle Brigade March 2, 1855, and Surgeon, December 30, 1864. He was promoted Surg.-Major in the Army Medical Department, March 1, 1873, and Brig.-Surg., November 27, 1879. He became Deputy Surg.-General October 23, 1881, and Surg.-Major-Gen., February 15, 1888. He retired from the Service on March 31, 1893.

He served in the Crimean Campaign in 1854-55, and was present at the Battle of the Alma, sortie of October 26, 1854, Battle of Inkerman, assaults on the Redan of June 18 and September 8, siege of Sebastopol (wounded). Medal with three clasps and Turkish medal. He was in India during the Mutiny of 1857-58, and was present at the actions of Cawnpore, siege and capture of Lucknow, attack on Fort Rooyah, action of Allygunge, battle of Newabgunge, passage of the Goomtee, occupation of Sultanpore, capture of Medjidie, affairs of Bankee and Sitka Ghat, and Oude Campaign. Medal with clasps. Afghan War, 1878-80. Entry into Candahar. Mentioned in despatches. Medal.

He was made a Companion of the Order of the Bath in 1886, and Honorary Surgeon to the Queen in 1895, and Knight of Grace of the Order of St. John of Jerusalem in 1897.

He held the appointment of Surgeon on the Personal Staff of the Viceroy of India, and was Professional Assistant at the Headquarters of the Army Medical Department from April 1, 1888, to April 1, 1893.

He was awarded a good service pension in July, 1902.

Surg.-Gen. G. J. H. Evatt, C.B., entered the Service March 31, 1865, as a Staff Assistant Surgeon. He was appointed Surgeon to the 25th Foot, June 5, 1866, and Surgeon, Army Medical Department, March 1, 1873. He was promoted Surg.-Major March 31, 1877; Surg.-Lieut.-Col., A.M.S., March 31, 1885; Brig.-Surg.-Lieut.-Col., November 30, 1891; Surg.-Col., March 30, 1896; and Surg.-Gen., November 20, 1899.

He served in the Perak Expedition, 1875—medal with clasp; Afghan War 1878-80; bombardment and occupation of Ali Musjid, Bazar Expedition, advance on Cabul, relief of Sherpur, and operations on the Ghuznee road. Mentioned in despatches, *London Gazette*, November 7, 1879. Medal with two clasps. Soudan Expedition, 1885; Suakin, commanding a bearer company; action at Hasheen; advance on Tamai. Mentioned in despatches, *London Gazette*, August 25, 1885. Medal with clasp and Khedive's Bronze Star. Operations of the Zhob Field Force, 1890. Mentioned in despatches, *London Gazette*, May 19, 1891.

ROYAL ARMY MEDICAL CORPS

The undermentioned Lieutenants to be Captains, dated June 21, 1903:—

P. H. Henderson, M.B., J. P. J. Murphy, M.B., A. R. Greenwood, F. H. Hardy, W. M. H. Spiller, M.B., A. D. Jameson, W. Bennett, M.B., B. B. Burke, W. B. Fry, C. R. L. Ronayne, M.B., G. Baillie, M.B., L. L. G. Thorpe, W. S. Crossthwait, P. C. Douglass, R. F. Ellery, R. L. Popham.

The seconding for Service with the South African Constabulary of Capt. C. J. O'Gorman, D.S.O., bears date September 13, 1902, and not as stated in the *Gazette*, of December 23, 1902.

Capt. L. J. C. Hearn is placed on temporary half-pay on account of ill-health, dated June 27, 1903.

Lieut. F. W. W. Dawson, from the seconded list to be Lieutenant, dated June 1, 1903.

Lieut.-Col. A. W. Browne, half-pay, retires on retired pay, dated July 15, 1903.

Lieut.-Col. A. E. J. Croly, from the seconded list, to be Lieut.-Col., dated July 7, 1903.

The following Lieutenants to be Captains, dated May 30, 1903: C. H. Carr, M.D., E. Bennett, F. P. Launder, A. C. Adderley, J. Tobin, H. E. Weston.

Lieut. K. C. Edwards resigns his commission, dated July 15, 1903.

SCOTS GUARDS.

Surg.-Major W. C. Beevor, M.B., C.M.G., is seconded for Service on the Staff, dated May 28, 1903.

Surg.-Major W. C. Beevor, M.B., C.M.G., is appointed Medical Officer on the Staff of Lord Northcote, Governor of Bombay.

CANADIAN ARMY MEDICAL SERVICE.

Lieut. F. L. Voux, Canadian Army Medical Service, is granted the local rank of Captain in the Army whilst serving in South Africa, dated February 20, 1900.

Capt. F. L. Voux, Canadian Army Medical Service, on having relinquished the local rank of Captain for service in South Africa, is granted the honorary rank of Captain in the Army, dated December 5, 1900.

VOLUNTEER CORPS.

His Majesty has been graciously pleased to approve of the "Highland Light Infantry, Volunteer Infantry Brigade," Bearer Company, being formed into an independent unit.

1st Kent Royal Garrison Artillery.—Surg.-Lieut. C. H. Anderson, M.B., resigns his Commission, dated June 24, 1903.

3rd Volunteer Battalion (the Queen's) Royal West Surrey Regiment.—Surg.-Capt. J. F. Hall, M.B., resigns his Commission, dated June 20, 1903.

3rd Volunteer Battalion the East Surrey Regiment.—Alfred Landon Watler Whitehouse, Gent., to be Surg.-Lieut., dated June 20, 1903.

3rd Glamorgan.—Surg.-Lieut. G. A. Stephens, M.D., to be Surg.-Capt., dated June 20, 1903.

4th Middlesex (West London).—Frederic Richard Miller, Gent., to be Surg.-Lieut., dated June 20, 1903.

The Electrical Engineers.—Surg.-Lieut. J. A. Masters, M.D., to be Surg.-Capt., dated June 27, 1903.

8th Volunteer Battalion the Royal Scots (Lothian Regiment).—Walter Petrie Simpson, Gent., to be Surg.-Lieut., dated June 27, 1903.

4th Volunteer Battalion the Cameronians (Scottish Rifles).—Surg.-Lieut. J. S. McKendrick, M.B., to be Surg.-Capt., dated June 27, 1903.

4th Volunteer Battalion the East Surrey Regiment.—The following Surg.-Lieuts. to be Surg.-Capt.: T. M. Morton, dated June 27, 1903; W. H. F. Young, dated June 27, 1903.

2nd Volunteer Battalion the Hampshire Regiment.—Surg.-Capt. A. B. Wade, M.B., to be Surg.-Major, dated June 27, 1903; Surg.-Lieut. O. T. Stephenson to be Surg.-Capt., dated June 27, 1903.

6th (Fifehire) Volunteer Battalion the Black Watch (Royal Highlanders).—Surg.-Major J. Mackay resigns his Commission, dated June 27, 1903.

4th Nottinghamshire Volunteer Battalion the Sherwood Foresters.—Harry Stallard, Gent., to be Surg.-Lieut., dated June 27, 1903.

1st Volunteer Battalion the Duke of Cambridge's Own (Middlesex Regiment).—Surg.-Capt. G. A. Cohen, M.B., resigns his Commission, dated June 27, 1903.

1st Volunteer Battalion the Prince of Wales' (North Staffordshire Regiment).—James McClew, Gent., to be Surg.-Lieut., dated June 27, 1903.

Volunteer Infantry Brigade Bearer Company. The Gordon.—The following gentlemen to be Lieuts.: James Smart, dated June 27, 1903; James Dickson Noble, dated June 27, 1903; John Wallace Milne, dated June 27, 1903.

1st Cornwall (Duke of Cornwall's) Royal Garrison Artillery. Surg.-Lieut. J. Ratcliff-Gaylard to be Surg.-Capt., dated July 4, 1903.

Royal Engineers (1st Cheshire).—Surg.-Lieut. F. R. W. Armour, M.B., resigns his Commission, dated July 4, 1903.

Submarine Miners, Mersey Division.—Capt. J. W. Lloyd resigns his Commission, dated July 4, 1903.

8th Volunteer Battalion the Royal Scots (Lothian Regiment).—Surg.-Lieut. G. A. Dickson, M.B., resigns his Commission, dated July 4, 1903.

1st Volunteer Battalion the Duke of Cambridge's Own (Middlesex Regiment).—Surg.-Lieut. G. P. Chappel, M.D., to be Surg.-Capt., dated July 4, 1903.

1st (Hallamshire) Volunteer Battalion the York and Lancaster Regiment.—Surg.-Lieut. S. F. Barber to be Surg.-Capt., dated April 11, 1903.

4th (Donside Highland) Volunteer Battalion the Gordon Highlanders.—Surg.-Lieut. D. Maver, M.B., to be Surg.-Capt., dated July 4, 1903.

1st Gloucestershire.—Surg.-Lieut. J. R. Bibby, M.B., to be Surg.-Capt., dated July 11, 1903; Surg.-Lieut. G. S. J. Boyd resigns his Commission, dated July 11, 1903.

1st Lancashire.—Surg.-Capt. J. A. Cornett resigns his Commission, dated July 11, 1903.

1st Volunteer Battalion the King's (Liverpool Regiment).—Surg.-Lieut. T. H. Agnew resigns his Commission, dated July 11, 1903.

4th Volunteer Battalion the Norfolk Regiment.—Surg.-Lieut. W. G. Galletly, M.B., to be Surg.-Capt., dated July 11, 1903.

2nd Volunteer Battalion the Royal Scots Fusiliers.—Surg.-Major W. J. Lawrie, M.D., resigns his Commission, dated July 11, 1903.

2nd Volunteer Battalion the South Wales Borderers.—Surg.-Capt. R. J. Paton, M.D., to be Surg.-Major, dated July 11, 1903.

3rd Volunteer Battalion the South Wales Borderers.—Daniel Jenkyns Thomas, Gent., to be Surg.-Lieut., dated July 11, 1903.

4th Volunteer Battalion the Queen's Own Royal West Kent Regiment.—The following Surg.-Lieuts. to be Surg.-Capt.: A. T. F. Brown, M.B., dated June 6, 1903; H. I. Bryan, dated June 6, 1903.

2nd Volunteer Battalion the Manchester Regiment.—Surg.-Lieut. C. C. Haywood, M.B., resigns his Commission, and is appointed Lieut., dated July 11, 1903.

1st Dumbartonshire.—Surg.-Lieut. W. B. Armstrong, M.B., to be Surg.-Capt.

Volunteer Infantry Brigade Bearer Company, Sussex and Kent.—Frederick Burroughs Jefferiss, Gent., to be Lieut., dated July 11, 1903.

Royal Army Medical Corps (Volunteers). Manchester Companies.—Lieut. A. T. Lakin, M.B., to be Capt., dated July 4, 1903. Lieut. J. F. Wright to be Capt., dated July 11, 1903.

The Woolwich Companies.—Capt. A. S. Greenway to be Major, dated June 20, 1903.

Army Medical Reserve of Officers.—Surg.-Capt. P. B. Bentiff to be Surg.-Major, dated July 11, 1903.

Volunteer Infantry Brigades. Welsh Border.—Surg.-Lieut.-Col. A. de la Poer Beresford, M.D., 2nd Volunteer Battalion the King's (Shropshire) Light Infantry, to be Brig.-Surg.-Lieut.-Col., dated July 4, 1903.

South Lancashire.—Surg.-Major F. J. Knowles, 2nd Volunteer Battalion the Prince of Wales' Volunteers (South Lancashire Regiment), to be Senior Medical Officer, dated July 11, 1903.

The King has been graciously pleased to confer the Volunteer Officer's Decoration upon the undermentioned Officers of the Volunteer Force, who have been duly recommended for the same under the terms of the Royal Warrant, dated July 25, 1892:—

1st Volunteer Battalion the Leicester Regiment.—Surg.-Lieut.-Col. Francis John Walker, M.D.

1st Fortarshire Royal Garrison Artillery.—Surg.-Major William Chalmers-Cowan.

5th Volunteer Battalion the Royal Scots (Lothian Regiment).—Surg.-Major James Allan Gray.

3rd Kent (Royal Arsenal) Royal Garrison Artillery.—Surg. Major Arthur Henry Robinson.

LEAVE FROM ABROAD.—The following Officers have arrived home on leave: Col. B. M. Blennerhassett, Lieut.-Col. H. O. Trevor, Capt. P. S. O'Reilly, Capt. A. H. Waring, Lieut. A. C. Duffey, Major J. H. E. Austin, Major R. Crofts, and Lieut. A. W. Sampey.

POSTINGS.—Major A. P. Blenkinsop has been posted to Salisbury Plain for duty. The undermentioned Lieutenants, on completion of the course at the Depot R.A.M.C., have been posted to the Stations specified:—

J. G. Bell, Aldershot.	J. M. M. Crawford, Woolwich.
R. H. Bridges, Aldershot.	C. Bramhall, Woolwich.
J. B. Meldon, Aldershot.	J. E. Harty, Woolwich.
R. C. Wilmot, Aldershot.	H. H. Swanzy, Woolwich.
J. A. W. Webster, Aldershot.	J. E. Skey, Woolwich.
J. H. Dugins, Aldershot.	H. T. Stack, Woolwich.
M. G. Winder, Curragh.	T. S. Coates, Netley.
E. M. Pennefather, Curragh.	A. E. B. Wood, Netley.
J. Gatt, Curragh.	J. C. G. Carmichael, Netley.
C. W. Holden, Curragh.	D. G. Carmichael, Netley.
H. B. Kelly, Curragh.	G. H. J. Brown, Netley.
D. Ahern, Curragh.	H. W. V. Dunbar, Netley.

CHANGE OF STATION.—The following changes of Station have taken place:—

Major J. R. Forrest, from Sheffield to Bombay.
 Major H. A. Haines, from Leicester to Sheffield.
 Major G. Bent, from Chester to Warwick.
 Capt. E. B. Steel, from Chester to Delamere Camp.
 Major A. Wright, from Portsmouth to Gosport.
 Lieut.-Col. F. J. Jencken, from Aldershot to Longmoor.
 Major R. H. Hall, from Cork to Kilnorth.
 Lieut. R. B. Ainsworth, from Netley to Portsmouth.
 Lieut. H. J. Crossley, from Netley to Dover.
 Lieut. N. E. J. Harding, from Netley to Dover.
 Lieut. J. Mackenzie, from Netley to Salisbury Plain.
 Lieut. R. L. V. Foster, from Netley to Salisbury Plain.
 Lieut. W. F. Tyndale, C.M.G., from Netley to Home District.
 Lieut.-Col. J. A. Gormley, retired, has been appointed to the medical charge at Kingston-on-Thames, vice Lieut.-Col. T. J. P. Holmes, who resigns.
 Lieut.-Col. R. W. E. H. Nicholson, retired, has been appointed to the medical charge of the Military Prison, Aldershot, vice Col. Rutledge, vacated.

ROYAL ARMY MEDICAL COLLEGE.—The following Captains have been selected to attend the next course at the College: J. H. Rivers, F. R. Buswell, F. A. Symons, C. G. Spencer, J. H. J. C. Goodwin, D. J. Collins, J. B. Anderson, A. E. Master, G. Dansey Browning, E. S. Clark, K. M. Cameron, P. Evans, C. K. Morgan, J. P. Silver, J. M. Buist, H. A. L. Howell, D. Lawson, E. B. Steel, H. E. Staddon, S. J. C. P. Perry, C. F. Wanhill, L. Addams Williams, M. McG. Rattray, J. G. Berne, J. S. Gallie, F. J. C. Hefferman.

SOUTH AFRICAN FUND.—The Committee of this Fund beg to intimate that a sum of about £110 remains in the hands of the Hon. Treasurer, the greater portion of which has been returned from South Africa, being the unexpended balance of an amount sent there for local requirements during the war. With a view to closing the fund finally it is proposed to hand over the money to the Compassionate Branch of the R.A.M.C. Fund lately organised by the Director-General, as it will then be available for cases of need amongst the men, women and children of the Corps. H.R.H. the Princess Christian has graciously signified her approval of the suggestion.

Should no expression of dissent be received from the subscribers within the next few days, it will be assumed that they concur.

THE ENNO SANDER MEDAL.—We are enabled to submit the accompanying drawings of this handsome medal, recently awarded to Major F. Smith, D.S.O., of the Corps.

This prize is open to all active and associate members of the Association of Military Surgeons of the United States. It is awarded upon the recommendation of a Board of Award selected by the Executive Committee. The Board determine upon the Essay to which the prize shall be awarded. In fixing upon precedence of essays submitted in competition for this prize, the Board take into primary consideration, originality, comprehensiveness, and utility of opinions advanced, and into secondary consideration, literary character. Essays are expected to contain



not less than ten thousand nor more than twenty thousand words, exclusive of tables. Each competitor has to send in three typewritten copies of his essay, and they must contain nothing to indicate the identity of the author, but be authenticated by a *nom de plume*, a copy of which, with the author's name, rank and address, is submitted in a sealed envelope. The successful essay becomes the property of the Association of Military Surgeons of the United States.

Associate membership is open to medical officers of the military and naval services of Great Britain and other countries. We have not yet heard what is the subject of the next competition, nor when it closes.

THE MAIDSTONE COMPANIES R.A.M.C.V.—The annual inspection of these companies was held at Maidstone by the Director-General, on June 24, in the Mote Park, the property of Sir Marcus Samuel, Lord Mayor of London, which was kindly lent for that purpose. The Director-General was accompanied by Col. Leake, P.M.O., of the Thames District and Lieut.-Col. E. M. Wilson, Deputy Assistant Director-General. There were more than 200 present on parade under the command of Major C. Pye Oliver, and a very thorough inspection was made, not only in drill and first aid, but also of the transport section. The Director-General presented medals and clasps to men of the Corps who had served during the War in South Africa.

Addressing Major Oliver, Sir William Taylor said that he was very glad to have an opportunity of presenting these medals, and regretted the delay which was caused by the fact that the men of the Maidstone Companies had served in several units in South Africa, and that therefore their names appeared on several medal rolls which had to be carefully examined in order that the several clasps to which each man was entitled should be correctly ascertained. He congratulated Major Oliver on the smart appearance of the men and the accuracy and intelligence with which they have gone through their work. He was also glad to learn that a considerable number had been employed at the Royal Victoria Hospital at Netley as trained nurses, and he was sure that the training they had there received would be of great advantage not only to themselves but to their comrades in the Corps who had not been able to avail themselves of this opportunity. He knew that Major Oliver was anxious to obtain a further increase of the Corps under his com-

mand, but it must be remembered that the sanction for such increases did not rest with the Medical Branch of the War Office. Personally, he wished the Corps every success, and hoped it would progress and prosper as much in the future as it had done in the past.

Before closing his remarks, the Director-General said that he thought they all owed a hearty vote of thanks to Sir Marcus Samuel for so kindly placing his beautiful park at their disposal, and he also wished to express his appreciation of the good services of their Sergeant-Instructor Staff-Sergt. Fowler, who after a long period of useful service was now taking his discharge. There were a large number of spectators present, and the whole parade went off very satisfactorily.

AMBULANCE WORK AT KILMARNOCK.—During the past few months a class of ambulance instruction in connection with the Kilmarnock Volunteer Companies has been carried out by Serg. Gibson (a well-known enthusiast in this work), under the superintendence of Surg.-Lieut.-Col. Frew, V.D. The class, which numbers amongst its members eight cadets, was recently examined by Lieut.-Col. Coats, R.A.M.C., who expressed himself as highly satisfied with the class as a whole and awarded special commendation to three of the members. On the evening of July 2, when the Companies were assembled in the Agricultural Hall, previous to marching out for battalion drill, the certificates of proficiency were presented to the deserving individuals by Surg.-Lieut.-Col. Frew, who also addressed to them a few words of commendation for their past work and encouragement for the future.

CRICKET.—In a match played on the Garrison Cricket Ground at the Curragh, on May 25, between the 17th Company R.A.M.C. and the Army Service Corps, the R.A.M.C. scored 109 against a total of 55 for the Army Service Corps. For the R.A.M.C. the highest scores were 23 by Staff-Sergt. Howell, 22 by Mr. Short, 18 by Lieut.-Col. Peterkin, and 17 by Sergt.-Major Bollen. A second innings was commenced in which Pte. Mayo scored 30, and Pte. Aldows 48 not out. The highest score for the Army Service Corps was 10 by Lieut. Page.

In another Garrison League fixture at the Curragh, between the 17th Company and the R.E., a very close match was seen, the R.A.M.C. winning by the narrow margin of 3 runs. For the R.E. the highest scores were: Corpl. Percy 49, Pte. Parver 34, and Mr. Scovell 19, the total score being 130. The R.A.M.C. scored 133 runs, of which Sergt.-Major Bollen contributed 46, Lieut.-Col. Peterkin 21, Tench 18, Short 13 and Parkinson 11.

A cricket match was played at New Brompton, on June 25, between the 10th Company R.A.M.C., Chatham, and the Dockyard Police, which resulted in a very tight game, the R.A.M.C. scoring 41 to 40 by the Dockyard Police.

In a match at Devonport, on May 20, between the R.A.M.C. and the Army Service Corps, the former made 88 to their opponents 108. The Army Service Corps were mainly indebted for their success to Lieut. Turner, who made 49. On our side the best score was made by Mr. Kimbell.

The Hampshire County Club are giving a trial to Black, a left-hand bowler belonging to the Corps. Black has done good work for the Aldershot Division, and we shall watch with interest his performances in County cricket.

BIRTHS.

GREEN.—On March 10, at Clapham, the wife of Capt. S. F. St.D. Green, R.A.M.C., of a son.

KEBLE.—On July 9, at 101, Canfield Gardens, Hampstead, N.W., the wife of Capt. A. E. C. Keble, R.A.M.C., of a son.

MARRIAGES.

PINCHES—YEATS.—On June 13, at St. Mary's Parish Church, Walmer, by the Rev. Canon Venn, William Hooper Pinches, Major R.A.M.C., son of the late W. B. Pinches, of Highgate, to Lilian Edith, younger daughter of Richard Oliverson Yeats, of Babsdem, Walmer, Kent.

DEATHS.

CAREY.—Surg.-Major Thomas Carey died at Hove on June 2, aged 76 years. He entered the service on January 24, 1851, and was placed on half-pay on February 6, 1874. He served in the 64th, 22nd, 87th and 7th Regiments, and was present in India during the Mutiny, being severely wounded at Lucknow.

COGAN.—Lieut.-Col. T. S. Cogan died in London on May 5. He entered the Service on April 1, 1867, and retired on February 20, 1889. In addition to his departmental service he also served with the 51st Foot and the Royal Artillery. He served in the Abyssinian Expedition in 1867-8, and received the medal.

FRASER.—Surg.-Gen. A. H. Fraser died on July 5, at Slough, Bucks. He entered the Service on February 21, 1851, and was placed on retired pay on reaching the age of 60, on May 18, 1897. He served with the 92nd, 75th, 88th and 40th Regiments, in addition to his departmental service. He was present during the Indian Mutiny, and was at the action at Murree and with the Delhi Field Force from October to December, 1857. He served also in the Afghan War in 1880, and was mentioned in despatches. He was selected to be Honorary Physician to the Queen in December, 1899.

ROBERTSON.—Hon. Brig.-Surg. Alex. C. Robertson died in London on May 15, aged 69 years. He entered the Service on June 1, 1855, and was placed on half-pay on January 25, 1882. He served in the Rifle Brigade and Royal Artillery, in addition to his departmental service. He was present in India during the Mutiny, and was at the siege and capture of Lucknow and subsequent operations in Oude. He also served in the Zulu Campaign in 1879.

 ANNOTATIONS.

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.—Miss H. Stuart has been appointed to be a Sister.

Miss L. M. Stuart, R.R.C., Matron, has been moved from Aldershot to Gibraltar.

Miss E. M. McCarthy, R.R.C., Matron, has been moved from Cadets' Hospital, Woolwich, to Connaught Hospital, Aldershot.

Miss H. McCurdy, Sister, has been transferred from Gibraltar to England, on completion of tour of foreign service.

Miss A. S. Bond, R.R.C., and Miss A. C. Jacob, have arrived home on leave from South Africa.

THE CAUSE OF LEPROSY.—Major T. G. Lavie, R.A.M.C., writes that the other day he was in course of conversation with a gentleman in the Indian Civil Service, who had a long experience as Commissioner in various districts in the Madras Presidency, and who volunteered the statement that he had been much interested in investigating the cause of leprosy, and had caused the officials compiling the census, &c., to make special inquiries in the case of lepers. This gentleman assured him that from the mass of evidence so collected he was absolutely convinced that the prevalence of the disease was almost confined to the consumers of putrid fish.

A large trade is carried on in the interior in "tamarind" and other fish, which is much relished by certain poor classes as a condiment, although absolutely offensive to western nostrils.

It is thought that the evidence of this officer, totally unbiassed, and with the opportunities he possessed of visiting obscure districts, may be of interest.

THE R.A.M.C. FUND.

The fifth meeting of the Committee was held at 68, Victoria Street, S.W., on Wednesday, June 10, 1903, at 3 p.m. Present :—

Surg.-Gen. Sir William Taylor, K.C.B., K.H.P., Director General A.M.S (Chairman).

Surg.-Gen. J. B. C. Reade, C.B., K.H.S.,	} Representing Retired Officers.
Surg.-Gen. H. Skey Muir, C.B.,	
Lieut.-Col. E. Fairland,	
Surg.-Gen. A. H. Keogh, C.B.,	

Col. W. L. Gubbins, M.V.O.

Col. H. E. R. James.

Lieut.-Col. E. M. Wilson, C.B., C.M.G., D.S.O.

Major R. H. Firth.

Capt. J. F. Martin (elected by Officers, R.A.M.C. Mess, Aldershot).

Capt. and Quarter-Master G. Merritt.

MINUTES.

(1) In considering the Minutes of the fourth meeting, Surg.-Gen. Muir pointed out that with regard to Minute 13, the sum of £34 would not cover some small incidental expenses connected with the Jameson Portrait Fund. The Committee resolved that this Minute should be amended as follows :—

Instead of "the sum of £34" read, "a sum not exceeding £36."

The Minutes were then confirmed as amended.

(2) The Committee considered the practicability of the Hon. Secretary of the Fund acting as Secretary to all the Sub-Committees, in order to co-ordinate the business of the Fund and its branches.

Such a step would necessitate appointing an officer who would have to devote most of his time to the work involved, and who would require to have an office and a typist clerk.

The Committee is of opinion that this is a matter which will probably require consideration later, but decided that the existing arrangement should continue for the present.

(3) The Committee considered a proposal from Lieut.-Col. Somerville Large, which is as follows :—

"To hand over a sum amounting to nearly £1,400 to the Compassionate Branch of the R.A.M.C. Fund on the condition that the sum be invested as Trust Money in the names of the Director-General and Deputy Assistant Director-General (A.M.D. 4), with power to add one more to their number, as Trustees; that the money so invested is never to be drawn upon; and that the interest accruing therefrom is to be spent in educating orphan children of Warrant or Non-Commissioned Officers of the Royal Army Medical Corps in some non-sectarian or non-religious charitable school or institution."

The Committee desired that Lieut.-Col. Somerville Large be thanked for his offer, and the following resolution be communicated to him :—

"The Committee is of opinion that it is not desirable to create a trust in the management of the Compassionate Fund, and asks that Col. Somerville Large be requested to say if he will modify his offer so as to enable the principal and interest to be devoted to the benefit of widows and orphans of the Corps in a similar manner to the funds already received for that purpose."

(4) With reference to the resolution contained in Minute 6 of the third meeting, the Committee resolved that the word "balance" be substituted for the words "remaining one-third."

(5) The Hon. Secretary was authorised to pay the Hon. Secretary of the Dinner Fund a sum not exceeding £100, to cover the expenses of the Annual Dinner.

(6) It was resolved to advertise the hour and date of the General Meeting of subscribers to this Fund in the *Morning Post* and *Standard*.

(7) The Director-General asked members of the Committee to notify before

the 15th inst. any special points they thought required reference to the General Meeting.

(8) Col. Welch having notified his inability to serve on the Sub-Committee appointed at the last meeting for the purpose of considering the Historical Record, the Committee resolved that the Sub-Committee should consist of four members, and appointed Col. W. Johnston, C.B., and Lieut.-Col. L. A. Irving, as members, if they will accept the post.

Surg.-Gen. Muir undertook to act as convener of this Sub-Committee.

(9) A letter from Lieut.-Col. Corban proposing that the "Compassionate Fund" should in special cases assist "in apprenticing or placing sons and daughters of large families of the Royal Army Medical Corps, thus giving them a start in life," was considered.

The Committee resolved that the following be added to the resolution contained in number 4 of the third meeting :—

"Or (d) In apprenticing or placing sons and daughters of Warrant Officers, Non-Commissioned Officers, or men of the Royal Army Medical Corps who have large families—thus giving them a start in life; or in such other manner as the Committee may think most to their advantage."

(10) Lieut.-Col. Wilson communicated to the Committee the Corps Order published by the Director-General in response to the request contained in Minute 3 of the fourth meeting.

(11) Lieut.-Col. Wilson made the following statement :—

"To report that in 1892 the late Sir W. A. Mackinnon, then Director-General, asked for subscriptions from the officers of the Corps serving at home on behalf of the Officers' Endowment Fund of the Corps of Commissionaires, for the payment of the salaries of the officers of the staff. The then 'Medical Staff' was estimated at three battalions, and the subscription required to place men of the Corps desiring to join the Corps of Commissionaires on the same footing as men of other branches of the Service was £6 6s. The amount has gradually risen to £8, and is collected annually in A.M.D. 4. There is, however, always considerable difficulty and delay in collecting these small sums, and a great deal of correspondence.

"It is, therefore, submitted, that now there is a distinct fund for the Royal Army Medical Corps, the payment might be made after this year, annually, on behalf of all the officers of the Corps, abroad as well as at home, and as the amount is for the benefit of the rank and file of the Corps, it might fairly be charged to the Compassionate Branch of the Royal Army Medical Corps Fund (apart from the Widows' and Orphans' Branch).

"I also think, as the establishment of the Corps has increased, and will probably increase still further, that next year the amount may be fixed at £10 annually."

The Committee considered the suggestion an excellent one, and on the proposal of Col. Gubbins, seconded by Col. James, resolved that, commencing next year, the General Relief Fund of the Compassionate Fund should be charged annually with the sum of £10 to be paid to the Officers' Endowment Fund of the Corps of Commissionaires.

B. M. SKINNER,
Lieut.-Col. R.A.M.C.,
Hon. Sec.

I.—REPORT OF THE DINNER SUB-COMMITTEE IN ACCORDANCE WITH THE RESOLUTION OF GENERAL COMMITTEE R.A.M.C. FUND, AT THEIR MEETING ON FEBRUARY 17, 1903.

The Committee of the R.A.M.C. Dinner Fund have considered the resolution of the General Committee and recommend :—

(1) That the present Dinner Committee shall continue to act as a Sub-Committee of the General Committee of the R.A.M.C. Fund, and that in order to secure as full a representation of the Corps as possible, it shall continue to consist as heretofore of :—

The P.M.O. Home District, representing also the R.A.M.C. Fund.

Three Retired Pay Officers.

The Commandant of the R.A.M. College.

An officer representing Aldershot and the Depot; an officer representing Woolwich; an officer representing Netley.

The D.A.D.G. for the Corps representing also the R.A.M.C. Fund.

(2) As a considerable number (about 180) Retired Pay Officers are still subscribing to the former Dinner Fund and not to the R.A.M.C. Fund, it is recommended that for the present their subscriptions shall be kept separate and credited to the Dinner Fund, the balance required to keep the charge for the Dinner for all subscribers at 12s. 6d. per head being made up by a grant from the R.A.M.C. Fund not exceeding the amount authorised by the meeting of the General Committee held on February 17, viz., 5s. per head for not more than two-thirds of the subscribers.

(3) The Sub-Committee report that at the present time £115 is standing to the credit of the Dinner Fund. This will decrease every year as officers join the R.A.M.C. Fund or retire from the Dinner Fund, but it is considered that the amount authorised will be ample in this and future years to admit of subscribers dining at a charge of 12s. 6d. per head.

At the present time more than seventy officers have signified their intention of being present, but the number will probably be at least 120.

E. M. WILSON, Lieut.-Col.,
Hon. Sec.

WIDOWS AND ORPHANS, R.A.M.C.

Receipts.		£	s.	d.	Payments.		£	s.	d.
1901.					Jan.,				
Mar. 27.	President Coy. Fund, No. 16 Gen. Hospl., S.A. (Widows and Orphans)	20	0	0	1901, to Disbursements to March, Widows, nineteen cases	46	10	0	
Dec. 24.	M. O., i/c Burghersdorp, S.A. (Widows and Orphans) ..	11	5	0	1902.				
1902.					1903.				
May 27.	Major Gray (Widows and Orphans) ..	0	19	3	Feb. 23.	Drummond Institute (Donation) ..	2	0	0
Sep. 25.	Col. Wilson, Standard Bank of S.A. (Widows and Orphans)	131	11	1	Jan. 27.	Lt.-Col. Wilson, C.B., C. M. G., D.S.O. (Benevolent Fund for Officers' Widows and Orphans) ..	28	6	0*
Nov. 6.	No. 7 Stny. Hospl., East London, S.A. (Widows and Orphans)	50	0	0					
„ 15.	No. 7 Stny. Hospl., East London, S.A. (Widows and Orphans)	352	12	2					
Dec. 13.	No. 1 Gen. Hospl., Wynberg (per Capt. Buist, R. A. M. C. (Widows and Orphans)	56	12	1*					
		£622	19	7	By Balance ..	£546	3	7	
						£622	19	7	
Credit Balance	£546 3 7								

March 31, 1903.

(Signed) H. A. HINGE, Capt. R.A.M.C.,
Hon. Sec., D.M.R.F.

* In accordance with the wishes of Captain Buist, half the sum of £56 12s. 1d. (shown on credit side) was to be given to the Benevolent Fund for Widows and Orphans of Officers, and the other half to the Widows and Officers of N.C.O.'s and men.

GENERAL RELIEF FUND, R.A.M.C.

<i>Receipts.</i>			<i>Payments.</i>		
		£ s. d.			£ s. d.
1901.					
Jan. 15.	Major Hale, R.A.M.C. (Relief Fund) ..	219 9 0	Jan.,	Local disbursements.	
Nov. 9.	O. C., V. M. S. C. (Grant to Fund) ..	1 12 11	1901, to	For detail see	
1903.			Mar. 1,	D. M. R. F. Book.	
Jan. 27.	Major J. Drew Moir, R.A.M.C. (General Relief) ..	20 0 0	1903.	(Temporary Relief)	112 1 9
Feb. 26.	Lt.-Col. A. S. Rose, R.A.M.C., De Aar (General Relief) ..	57 8 8	Mar. 1	Local disbursements.	
			to 31.	For detail see	
				D. M. R. F. Book.	
				(Temporary Relief)	13 5 0
				By Credit Balance ..	173 8 10
		<u>£298 10 7</u>			<u>£298 10 7</u>

Credit balance £173 3s. 10d. Interest on £600 (deposit a/c amounting to £4 7s.) was decided by the Sub-Committee should be placed to credit of this fund = £177 10s. 10d.

March 31, 1903.

(Signed) H. A. HINGE, Capt. R.A.M.C.,
Hon. Sec., D.M.R.F.

II.—REPORT OF SUB-COMMITTEE FOR THE COMPASSIONATE FUND.

Report of a Sub-Committee meeting held at Aldershot on April 2, 1903, to enquire into the accounts of the Compassionate Fund, for the information of the Committee of the R.A.M.C. Fund. The following members were present:—

President: Surg.-Gen. W. H. McNamara, C.B., C.M.G.

Members: Lieut.-Col. G. W. Robinson; Lieut.-Col. E. M. Wilson, C.B., C.M.G., D.S.O.; Major F. J. Greig; Capt. H. A. Hinge (Hon. Sec.).

(1) The resolution of the General Committee at their third meeting held on February 17, 1903, was read.

(2) Capt. Hinge presented a statement of the accounts of the Fund by which it appeared that, at the commencement of the war, a considerable sum of money was received from various sources to be used for the benefit of N.C.O.'s and men of the Corps who might be in distress on account of the absence of their relatives in South Africa.

This was expended as necessity arose from time to time by Major G. H. Hale, D.S.O., but no regular Committee was formed. On January 1, 1901, a Committee was formed at the Depot. At that time there was a balance of £219 9s., £289 10s. having been expended up to that date in relieving cases of urgent distress, out of a total of £508 19s. which had been collected.

(3) This balance continued to be utilised for cases of general distress, but in March, 1901, money began to arrive from South Africa, being contributed from officers' messes and canteens of the Corps, which, by the direction of the donors, was to be applied solely for widows and orphans. These sums of money were therefore kept separate and utilised for these purposes.

(4) Two balance sheets, showing the sources and distribution of the Fund divided up into "Widows and Orphans" Fund and "General Relief" Fund, from January 1, 1901, to March 31, 1903, are appended. These show the credit balance of the Fund as follows:—

Widows and Orphans Fund	£546 3 7
General Relief Fund	177 10 10

(5) A general statement of the disbursements is placed before the Sub-Committee and appended (Depôt Mobilisation Relief Fund).

(6) The accounts were inspected and passed by the Sub-Committee.

(7) At a discussion after, it was decided, subject to the approval of the General Committee: (a) That enquiries should be made with regard to any suitable Orphanage or School, with the idea of making a permanent subscription to the

same for the benefit of orphan children of the Corps. (b) As regards subscription to Hospitals, it is thought that donations might be given as individual cases of distress arise. (c) That the two Funds should, for the future, be kept completely separate at the Bank. (d) As the calls on the "General Relief" Fund were at present more urgent, that the sum of £4 7s., being the interest upon £600 at deposit, should be credited to that Fund. (e) That as cases of distress are now few, the Committee do not think it necessary to ask for any grant at the present time.

Aldershot,
April 3, 1903.

(Signed) H. A. HINGE, Capt.,
Hon. Sec. Compassionate Fund.

DEPOT MOBILISATION RELIEF FUND.

Statement of Accounts from January, 1901, to March, 1903.

Fifty-four cases of urgent need have been afforded temporary assistance from the Depot, R.A.M.C.

Nineteen widows have received temporary relief, three of whom are receiving monthly grants of £2 to tide over difficulties.

Three men late of the Corps are receiving monthly aid temporarily (£2) to tide over difficulties caused by serious illness.

Two women (wives of men of the Corps) are receiving temporary monthly aid (£2) to tide over difficulties caused by husbands being on foreign service.

Colonel Wilson, C.B., C.M.G., D.S.O., has received £50 from the Fund for disbursement to urgent cases of need reported at Headquarters.

Donations :—

To Drummond Institute	£2 0 0
To S. and S. Families' Association.. .. .	10 0 0
To Benevolent Fund Officers' Widows and Orphans (by request of the donors).. .. .	28 6 0

Total receipts to the Fund (since January, 1901).. 921 10 2

Expenditure :—

Widows and Orphans.. .. .	£76 16 0
General Relief	125 6 9
	<hr/>
	202 2 9

Balance Credit	719 7 5
Interest on £600 deposit at 2 per cent.	4 7 0
	<hr/>

Balance in hand	723 14 5
-------------------------	----------

Of this £546 3s. 7d. is to the credit of the W. and O. Fund, according to the wishes of the donors, and £177 10s. 10d. is available for cases of general distress.

The two accounts will, in future, be kept separate.

Aldershot,
March 31, 1903.

(Signed) H. A. HINGE, Capt. R.A.M.C.,
Hon. Sec., D.M.R.F.

III.—REPORT OF BAND SUB-COMMITTEE TO MARCH 31, 1903.

Report of a Sub-Committee Meeting held at Aldershot on April 17, 1903, to audit the accounts of the Band Fund for the information of the Committee of the R.A.M.C. Fund.

(1) Capt. Hinge, Hon. Secretary, presented a balance sheet for the first quarter ending March 31, 1903 (attached), showing the credit balance on that date, £75 1s. 10d.

A balance sheet showing the total actual receipts and expenses during the year 1902-1903, and one showing the probable expense and requirements for 1903-4, is attached.

(2) The accounts were inspected and passed by the Sub-Committee.

(3) It was proposed, in view of the expenses for the next year, to ask the R.A.M.C. Fund Committee for a grant of £200, to be paid, either quarterly or as one amount, to the credit of the Band Fund.

Aldershot,
April 17, 1903.

(Signed) H. A. HINGE, Capt.,
Hon. Sec., R.A.M.C. Band Fund.

March 31, 1903.

Aldershot, April 10, 1903.

* This amount was credited to the Fund in the December account, 1902.

(Signed) H. A. HINGE, Capt., Hon. Sec., R.A.M.C. Band.

PROBABLE BALANCE SHEET FOR YEAR 1903-4 FOR R.A.M.C. BAND.

Aldershot, April 15, 1903.

ACTUAL RECEIPTS AND EXPENSES FOR 1902-3.

[illegible]

(Signed) H. A. HINGE, Capt., Hon. Sec., R.A.M.C. Band.

NOTICE TO SUBSCRIBERS.

THE Editor will be glad to receive original communications upon professional subjects, travel and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications, &c., have been received from Lieut.-Col. Deane, Lieut.-Col. Mosse, Major Haines, Major Bewley, Major Clark, Major Caldwell, Major Cottell, Capt. Faichnie, Capt. Lawson, Capt. Pilcher, Capt. Stalkartt, and Lieut. H. H. Brown.

The following periodicals have been received: *The Veterinary Journal*, *The Medical Review*, *St. Thomas's Hospital Gazette*, *The Ophthalmoscope*, "An Inquiry into the Etiology of Beri-Beri," by Dr. H. Wright; "The Malarial Fevers of British Malaya," by Dr. H. Wright; "Modern Bullet Wounds and their Treatment," by Major F. Smith; "The Sanitation of British Troops in India," by Major Freeman, and "Report on Plague in Calcutta," by Lieut.-Col. Deane.

Journal
of the
Royal Army Medical Corps.

Original Communications.

THE TREATMENT OF GUNSHOT FRACTURES OF
THE ARM.

By CAPT. E. M. PILCHER, D.S.O.
Royal Army Medical Corps.

THE following three cases came under my immediate observation in the course of the recent campaign, and as they present points of contrast in the treatment, besides affording evidence of the peculiar shattering action of the modern bullet at short ranges, I have thought it worth while to quote and discuss them from the two points of view above indicated.

The first case noted is that of Trooper J. F., Imperial Light Horse, who was struck at an unknown, but probably short, range by a Mauser bullet, which shattered the left humerus. On examination a small wound of entrance and a very large aperture of exit were noted, together with a high degree of comminution of the bone. It seemed, indeed, as if at least four inches of the bone were lost. Impressions of the moment are quoted, and it may be observed here how great is the possibility, especially to a surgeon unaccustomed to gunshot injuries, of exaggerating the amount of the injury and the loss of bone incurred, even in a wound freely opened up for examination. Actual measurement in the present case gave less

than two inches between the ends. At the same time there was no evident injury to the vessels or nerves, and the movements of the muscles and forearm and hand were in no way impaired. Nevertheless, for reasons which I propose to consider more fully later on, the arm was removed at the shoulder-joint on December 13, 1900, a few hours after the receipt of the injury. After an absolutely uneventful recovery he was discharged on January 18, 1901.

The second case was that of Sergt. W. G. P., of the Imperial Yeomanry, who was struck in the left humerus by a Mauser bullet at the range of certainly not much more than 200 yards. Here again the case on examination presented the characteristic features of severe bone injury, inflicted at a short range by a small, hard bullet travelling at a high velocity. The entrance wound was small, the exit wound very large and ragged, and to the finger inserted into it a sensation was conveyed as of a bag of bone chips. All that the finger could teach was that probably three or four inches of bone were gone, and that the fragments representing them were lying loose in the tissues, and could in one or two instances be easily evacuated by the finger. In this case also the immunity of the large vessels and nerves from injury was astonishingly perfect. The escape of the musculospiral nerve under the circumstances was little short of miraculous. Amputation was performed on October 8, 1901, a few hours after the receipt of the wound; and as far as the arm was concerned, the result was an uneventful recovery. As bearing on the question of amputation, it may be of interest to note that this man also had his common femoral artery completely divided by another bullet, that a diffuse traumatic aneurism formed in the groin, which was cut down upon by the "old" method some ten days after the injury, and the ends of the vessels secured with considerable difficulty after an enormous amount of blood had been lost. It was considered that his chance of recovery would be better, apart altogether from the consideration of the possibility of preserving the arm, if, with two severe wounds, a source of pain and possible suppuration and hectic was removed. He made, as a matter of fact, a good but slow recovery.

The third case occurred in point of time previously to both the others, and the progress and event of it perhaps influenced

our treatment in the other two. Sergt.-Major W. H. F., of the Cape Police, was struck in the right humerus by a Mauser bullet at a range of under 100 yards on August 30, 1900. Fragments of bone were found on his coat sleeve when he was first dressed. The wound of entrance was at the back of the arm, and was small, but at the same time considerably larger than the usual Mauser bullet wound. It is, in fact, uncertain whether or not the bullet was deformed by passing through the side of the railway carriage in which the patient was travelling. The wound of exit was a huge opening on the front of the arm, and on exploration through it some two or three inches of the bone in large fragments were evacuated. After consultation, amputation was unanimously recommended, but resolutely refused by the patient, and accordingly an attempt was made to save the limb. Progress at first was not satisfactory. Besides the difficulties of keeping the fragments in apposition and at rest, there was a great deal of constitutional disturbance, including an attack of pneumonia. The wound however, remained aseptic and practically free from pus throughout. An inside angular splint was used, and an attempt made to approximate the widely-separated ends of the bones by passing a bandage round the elbow and shoulder, the latter being protected from pressure by a moulded cap formed of perforated zinc. The condition of the hand and forearm at this time is of interest. As in the two cases just quoted, there was at first no loss of function of any kind. Neither paralysis nor loss of sensation was observed, but on December 12 some œdema of the hand and forearm was noted, with pain in the distribution of the musculospiral nerve, which, however, disappeared later on. On November 11 a skiagram was taken of the arm and the fragments found to be in apposition; but there was considerable eversion of the upper fragment, which was so short as to be apparently beyond the possibility of fixation. Soon after the same date signs of necrosis of both ends of the bone were observed. Mr. Kendal Franks saw the patient at this stage, and considered wiring possible, but not until the sequestra had separated. The patient was sent to England with this object in December, 1900. In the following April he wrote that he had had some dead bone removed from his arm on two occasions. He had then been in hospital

"seven months and four days." The last record I have of him is an entry in the operation book at Netley, whereby it appears that on May 23, 1901, he was marked "unfit," and was described as having an ununited fracture of the humerus with one and a half inches (?) deficiency of bone. I regret that I have not been able to trace this man after he left Netley.

Now the condemnation or preservation of so important a limb as the arm is to any surgeon of conscience and sensibility a matter of capital importance, and when he acts against authority he does so with many heart-searchings, which are none the less bitter that they are sometimes posthumous, so to speak. Action in time of war is imperative sometimes, in the absence of an opportunity to consult authorities. In the three cases above quoted, authority lays down the proper course of action with no uncertain voice—with hardly a qualification, indeed. Esmarch says amputation is only indicated when it renders the prospect of saving life better than conservatism. This is an admirable maxim, and evidently in no sense ties the surgeon's hands, but it is hardly particular enough to cover doubtful cases. Guthrie considers that there is scarcely any injury of the soft parts likely to occur which would authorise a primary amputation. Tegouest says that comminution of the shaft of the humerus, even when complicated by wound of the brachial artery, does not necessarily imply amputation. Sir Thomas Longmore considers that an attempt should be made to preserve the limb as a rule; one exception being "extreme injury to the bone by a massive projectile." Colonel Stevenson, in "Wounds in War," gives the opinion above quoted, with several others to the same general effect, and adds that the indications for primary amputation do not depend upon the degree of comminution of the bone, but upon injury to the soft parts, and especially upon the site of the injury to the brachial artery, if it, too, is wounded. He thinks primary amputation is advisable only when the limb is "greatly disorganised by large projectiles or their fragments." He also quotes Otis in support of the statement that, unlike that of civil practice, the experience of military surgery shows a very small proportion of ununited fractures and false joint arising from gunshot injury to the humerus. Here, then, we have as against primary amputation in gunshot wounds of the humerus a crushing unani-

mity of opinion, delivered by a body of surgeons whose dicta on military surgery carry the greatest weight. If an exceptional case should arise, the onus of proving that amputation was necessary is placed upon the shoulders of the man into whose hands such a case falls, and the responsibility is very real. The solidarity of opinion against amputation probably makes his recollection of it distressingly vivid. And yet he has before him a case like any of the three described, in which he knows that long and painful journeys in jolting vehicles are before his patient, that the case is likely to pass through the hands of many different surgeons, all of whom cannot be expected to observe the sedulous particularity of antiseptic detail which is requisite for perfect conservatism, that the humerus is pre-eminently the bone which lends itself least readily to immobilisation, and, in short, the many circumstances against success. He has also the hopelessly disorganised bone before his eyes, and, very naturally, he thinks it possible to make out an argument for amputation in certain cases not recognised by the authorities.

The question, to my mind, seems to turn almost entirely upon the amount of bone completely lost. Taking Case No. 3 as an instance of attempted conservatism and of extreme loss of bone, the conservative method turned out a hopeless failure. Nine months in hospital with continual necrosis of the ends of a bone, which has already lost at least a couple of inches in its continuity ! And this necrosis is not the comparatively rapid variety associated with active pus formation ; because it must be understood that the wound was being treated by the antiseptic method, and, so far as that method was concerned, with perfect success. Necrosis in aseptic wounds is of the slow kind described by Makins in his "Surgical Experiences" as "antiseptic necrosis." In other words, a very slow but not less fatally continuous widening of the gap was taking place, and the hope of successfully wiring the ends of the bone was *pari passu* becoming remote. The case in the end comes to be a mere question of the possibility of usefulness of an arm from which practically the whole humerus had disappeared. A limb the subject of infantile paralysis and subsequent atrophy seems useful by comparison. It is a question even whether it would be possible in this case to apply some kind of support to stiffen the upper arm. A support needs a purchase of some kind from a fixed bony point, and it has been shown that the upper

fragment was too short to deal with successfully in this way. I have barely alluded to the complications which retarded this man's recovery. They were accidental, no doubt, and indeed are not necessary to emphasise the ill success of the case. But he had by no means the worst of the ills which may befall a man exposed to the many hardships of campaigning. In particular he escaped the deadly drain of hectic following prolonged suppuration, an accident which may have been rendered unlikely by the care and vigilance of antiseptic military surgery, but which always menaces.

The conclusion, then, to which one is driven is that the fear of unnecessarily depriving a man of an important limb has in this case led directly to a surgical fiasco.

When so large an amount of bone is completely lost, the case should no longer be regarded as an ordinary comminuted fracture. It should be classified rather among those for which some surgeons have performed resection of the shattered bones in their continuity. Now this operation is unsparingly condemned by most authorities. According to the experience of the surgeons in the American War of the Rebellion, it is more fatal than amputation. Colonel Stevenson ("Wounds in War," p. 224) says of it: "The only cases where it might at first sight be considered that excision is indicated are those in which the immediate site of the fracture is completely cleared of bone tissue, and there is loss of substance between the fractured ends for two or three inches. In injuries of this class the excision of the uneven ends of the bone might be looked upon as sound practice; but it has proved to be otherwise. Fractures with extensive loss of substance are exceptional; moreover, they are always the result of bullets fired at short ranges, and the damage is likely to be so great as to necessitate primary amputation rather than any other method of treatment. When excisions are performed, secondary amputations have frequently to be done later; false joint is a common result; and they kill more patients and less often preserve useful limbs than does the conservative method." The actual amount of bone substance indicated by the words "extensive loss of substance" might have been more definitely stated, but with the substance of the above opinion I am led to concur by the experience of the cases quoted, and I think it bad surgery, and cruel to the patient, as raising false hopes of ultimate cure, to attempt to preserve a limb rendered useless by the loss of three

or four inches of bone in the continuity of the humerus. I am inclined to put the limit of complete loss of bone at which there is any prospect of successful wiring as two and a-half inches. The humerus has been considerably shortened by the removal of a portion of the shaft to bring together the retracted ends of a divided nerve when all other means failed. A deliberate surgical procedure of this kind may be and has been successfully performed under favourable circumstances, but it should be steadily borne in mind that loss of substance by a deliberate and carefully planned surgical procedure is a very different matter from that produced by an expanding bullet; but I am not acquainted with any recorded case of gunshot wound in which wiring has been successfully undertaken when more than this amount of the humerus has been completely lost. The real difficulty in the hurry and necessarily rapid decisions of surgery in the field is to accurately estimate the real loss of bone. In Case 2 the amount of loss was over estimated. But the other severe injury was taken into account, and it was considered that amputation gave the patient a better chance of life under the circumstance than conservatism. In the first case quoted I have no doubt whatever, on a calm review of the case with the shattered bone before me, that amputation was the only course possible. But while a case may be made out for primary amputation in both these instances, it is by no means certain that so radical a procedure as amputation at the shoulder-joint was indicated. Not even the fear of splintering into the joints need have induced us to adopt so drastic a measure as removal of the whole bone. This point will be reverted to later, and, to sum up, it is proper to say that the choice between conservatism and amputation in gunshots of the humerus is influenced partly by the amount of bone actually lost, and partly by other considerations than the actual condition of the limb. If every man in a climate like that of South Africa, which is pre-eminently suited to surgical cases, could be treated where he fell, conservatism would be indicated in many cases of apparently desperate mutilation. But the case is far otherwise if he passes through many hands, has a long distance to travel, or has other wounds of a serious nature beside the bone injury. Esmarch's general dictum, in fact, covers the ground completely. The best must be done for each case on its merits, including

even amputation. It has often been the despair of surgeons in the more advanced field hospitals of a force to hear complacent accounts of marvellous conservative results obtained in well-appointed base hospitals. They are not conscious of possessing more destructive instincts, nor, may I add, less professional skill than their stationary *confrères*, but they have to arrange to carry their patients over the veldt, as well as operate upon them, and their attitude of mind is naturally somewhat different when a nice question of surgical procedure crops up. At the same time it is freely acknowledged that a special case is being pleaded for special circumstances, and that amputation in these antiseptic days should be looked upon as a *pis aller*, and only undertaken after the most careful and anxious examination and consultation.

So much, then, for the cases quoted from the point of view of the choice of treatment. The nature of the shattering and the mechanism of its production, which it is proposed to consider next, can be studied upon the bones themselves. These latter have been reconstructed, and are shown in the drawings annexed. Each bone has been drawn from an anterior and a posterior aspect, and, in addition, a projection of the shattered region has been prepared to scale by wrapping tracing paper, divided into quarter of an inch squares round the reconstructed bone, tracing the contour of the fragments and of the broken ends, taking in both cases the aperture made by the bullet as a centre, and then spreading the paper out flat. The fragments were then numbered and the amount of intact bone indicated by shading.

At first sight there appears to be a considerable difference in the nature and amount of the comminution in these two cases, but it is possible to perceive points of similarity. And the more closely the injuries are studied, the easier it becomes to recognise that the mechanism of the fracture in both cases is the result of absolutely identical principles. It may be open to question if these principles apply similarly to all long bones. Probably they would vary somewhat for each bone, being dependent in part upon the structure and shape of each bone, and in particular they would certainly have to be somewhat modified for the weight-carrying bones such as the femur and tibia. But it is also probable that they apply equally to all humeri similarly struck.

It is proposed first to describe each bone separately, to note

the differences between the cases, then the points of similarity, and then to point out the deductions which may be made as to the mechanism of destruction.

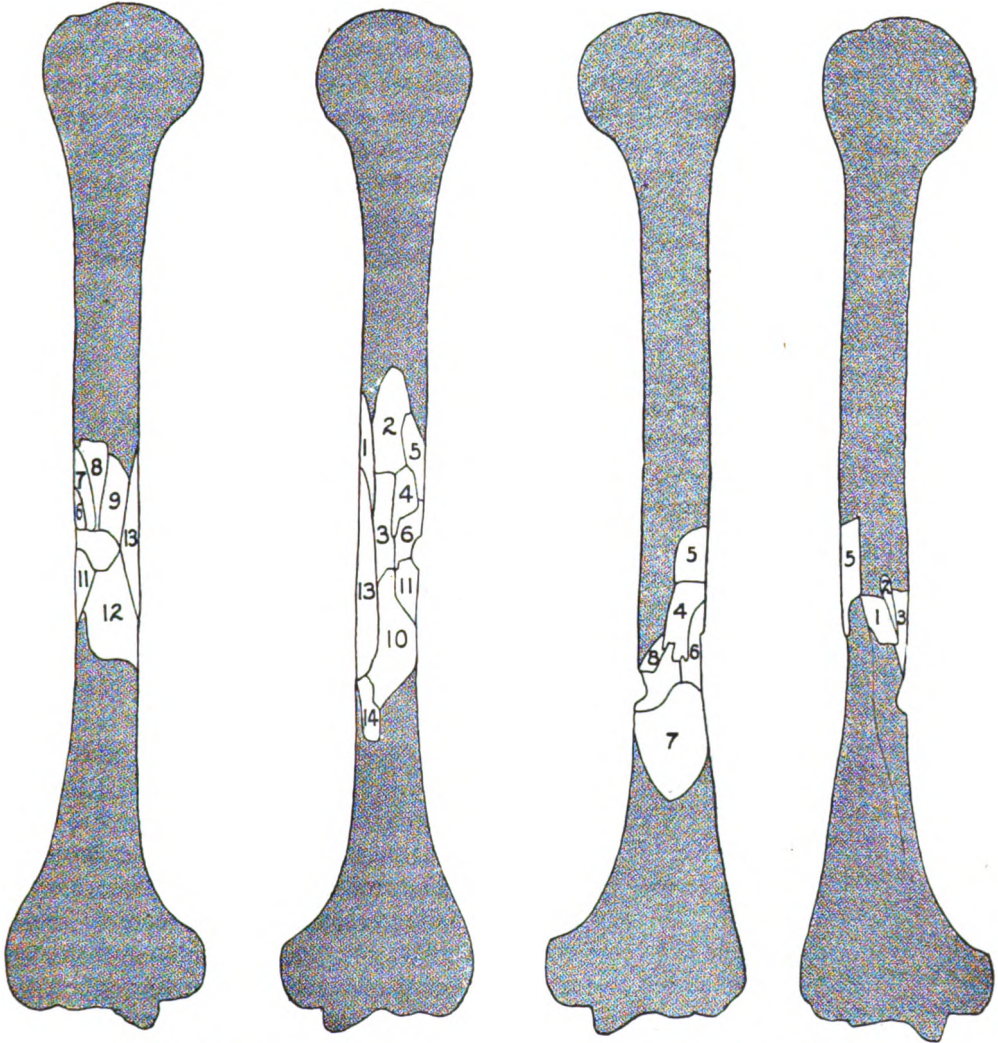


FIG. 1.—CASE 1.

FIG. 2.—CASE 2.

In Case 1 : (1) The fragments are numerous and of small size. (2) The uninjured ends of the bones are short, about $1\frac{1}{2}$ inches long, and pointed. They are separated by an interval of $1\frac{3}{4}$

inches, and both are upon that aspect of the bone which shows also the point of impact of the bullet. This point is of importance as regards the question of treatment, and moreover it is a condition of things very constant in bone injuries of this nature. (3) The actual point of impact of the bullet shows complete loss of substance over an area amounting to a square inch or more. The bone here was probably reduced to a particulate form, and was felt as bone dust in the tissues. At the same time it may be noted that the central canal was barely opened by the bullet, only one wall of the shaft cylinder being involved; in other words, the blow was a glancing one. This point will be reverted to later. (4) The opening of the bullet wound is on the outer side of the shaft, and from the direction of the bevelling and the external circumstances of the wound it is inferred with great probability that the direction of the blow was from behind forwards and outwards (fig. 1).

In Case 2: (1) The fragments are fewer and of somewhat larger size. (2) The uninjured ends of the bones are longer, being 2 inches and $2\frac{3}{4}$ inches long respectively. They also overlap to the extent of $1\frac{1}{4}$ inches. They are both seen on that aspect of the bone which is in the neighbourhood of the point of impact. (3) The loss of substance at the point of impact is less, and it is possible that the central canal was not opened at all. The fragment marked (8) was not found; it may have been driven out of the wound of exit, possibly in two or more pieces, and so have been lost. Even less of the thickness of the shaft is involved, and so this case is a more marked instance even than the first of a glancing blow. (4) The opening of the bullet wound is on the inner side of the shaft, and the direction of the blow is judged to have been from behind, forwards and outwards, and at the same time a little upwards. (5) There is in the lower fragment a crack extending from the highest part of it nearly to the elbow-joint on the posterior aspect of the humerus (fig. 2).

The points of difference, then, between the two bones are the following:—

- (1) The crack just mentioned in Case 2.
- (2) The opening of impact is smaller and the pulverisation at this point is less in Case 2 than in Case 1.
- (3) There is also less splintering in Case 2, making it probable either that the bone was hit at its extreme edge, the blow involving

not even the entire thickness of the cylindrical wall, or that the range was greater in Case 2, and the momentum of the bullet less. Probably the first explanation is the true one.

(4) The point of impact is on the outer side in Case 1, on the inner side in Case 2, where the fracture encroaches upon that part of the shaft which begins to alter from the cylindrical shape of the upper part to the prismoid shape of the lower part. I cannot see, however, that the shape of the part struck affects the considerations noted below to any appreciable extent.

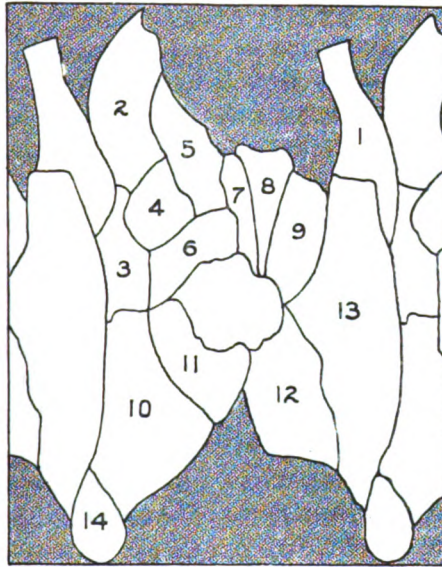


FIG. 3.—CASE 1.

(5) The direction of the bullet is from behind forwards in both cases. There is, in addition to the forward and outward direction, a slight upward tendency in the bullet track of Case 2, but the only effect of this element of direction seems to be that the shattering is appreciably more above than below the point of impact.

The above are points of contrast rather than vital differences, as far as the mechanism of fracture is concerned. Of far greater significance are the points of similarity, which may be summed up as follows:—

(1) Taking the diagrams and comparing the two cases together, it will be seen that in each case there is a point of impact, indi-

cated by an area of greater or less bone loss, and, exactly opposite to this point of impact on the shaft of the bone, there is a longitudinal line of fracture in the long axis of the shaft. If curved lines are drawn from the point of impact round the bone to meet the extremities of this longitudinal line, they are seen to represent with fair accuracy the direction of the principal or boundary fractures enclosing the centre-shattered area. Where there is want of correspondence between the actual lines of fracture and these arbitrary curved lines is in that part of the bone which lies behind the point of impact in both cases. This is very well shown in

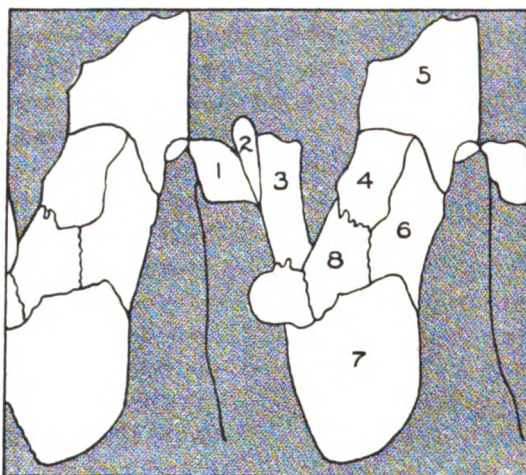


FIG. 4.—CASE 2.

Case 2. The correspondence with the line of fracture is exact and very remarkable in the forward direction of impact in both cases. The phenomena above noted are common to both cases, and seem to indicate that from the continuity of both bones a portion has been cut away of a more or less conical shape, the apex of the cone being at the point struck and the base towards the opposite aspect of the bone.

(2) It is worth noting that the left arm is hit in both cases. The only point of interest raised by this fact is that there might be slightly less hesitation in removing a left than a right arm.

(3) It was found upon measurement that the perimeter of the humerus in both bones throughout the shattered area was

2½ inches, a fact which made accurate drawing and measurement easy, as well as subsequent comparison.

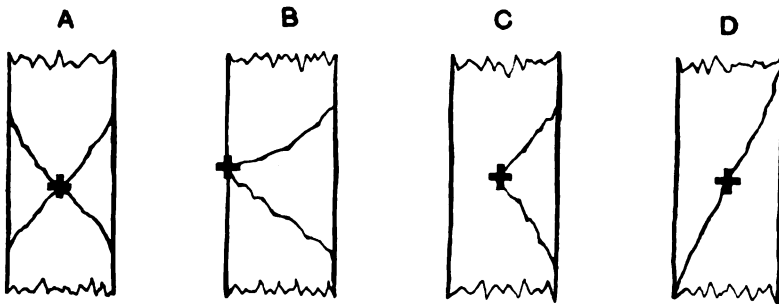
The following comments seem obvious from the above diagrams and descriptions :—

(1) Both cases illustrate admirably the tremendous destruction caused by a glancing or partial blow by the modern small-bore bullet, the hardness and high velocity of which more than compensate for its lightness.

The immediate local effect is seen to be a complete loss of bone by particulate disintegration. The same effect may be noted in some other tissues ; the skin, for example, at the wound of entrance is not simply divided, but a portion of it, corresponding to the sectional area of the bullet, is actually punched out. There is no doubt that in the clean perforating wound, where bone is not involved, and the elasticity of the more or less fluid tissues modifies the secondary lateral effects noted below, the tissues along the entire track are also destroyed.

But it is the secondary local effect, that produced upon the part of the bone not actually touched by the bullet, which is really of great importance. And here it may be well to enunciate and illustrate by diagrams the views recently published of the effect of a bullet wound upon the shaft of a long bone.

The accompanying diagrams indicate roughly these effects.



A is struck in the centre of the shaft, the bullet passing out at a point on the bone opposite to the part struck ; in other words, the bone is completely traversed by the bullet. A variant of this form is the so-called "butterfly" fracture, in which the ends of the fragments are left pointed and two triangular lateral fragments are thrust outwards on either side.

B represents the so-called typical "complete-wedge" fracture. C is the incomplete wedge.

D represents a form of fracture which is said to be comparable to the spiral and other twisted fractures seen in the lower extremity in civil life. It is suggested that it may be due to the modifying influence of the weight of the body, and in it one of the crossed lines seen in A is suppressed.

In all these cases the cross represents the point of bone struck.

Evidently the two cases figured in this paper come under the heading of "wedge" fractures, as illustrated by B and C. The bullet makes a lateral impact with the shaft, and from the point struck radiating fissures extend to the opposite margin, so that a wedge-shaped piece of bone is separated. This wedge-shaped portion of bone is nearly always secondarily comminuted, the main fissure being often accompanied by secondary lines which run a somewhat parallel course to the main one. This may be seen clearly in Case 1, the fragments which are numbered 1, 2, 3, 10, 13, 14, forming an outer ring, the remaining fragments forming an inner ring round the hiatus of destruction caused by the actual impact of the bullet. Probably, too, the explanation of the crack in the lower fragment of Case 2 is that it is part of a secondary fissure between an inner and an outer ring of fragments. The deduction seems, then, to be that from the point of impact a cone of succussion or vibration travels outwards, perhaps in the form of concentric waves comparable to those produced in the rigid crust of the earth by the shock of an earthquake. If a point at the extreme edge of a long bone be struck it is obvious that practically the whole width of the shaft falls within the sphere of destruction of this cone of vibration, so that a glancing blow is positively more destructive than one which makes a direct impact upon the centre of the shaft.

(2) The condition of the shattered ends left by such an injury deserves notice. Since a wedge-shaped piece is driven out sideways from the point of impact, it follows that each end left is pointed. And, moreover, it may be observed that these pointed ends are both upon the same aspect of the shaft. The shaft formed by two quill pens placed point to point illustrates the condition left by an injury of this kind to a hollow cylindrical shaft. The bearing of this fact upon treatment is this, that no adaptation of the ends is possible without the removal of the bone. No wiring

of ends so pointed can be performed with any hope of success till the ends have been prepared by cutting away the sharp points of bone left, and this is necessarily a serious consideration where so much bone has been already lost.

(3) The presence of the crack in the lower end of Case 2 has already been alluded to as possibly the limit of the first wave of vibration. But the crack in question is coming dangerously near the elbow-joint, and it seems worth while to point out in this connection the difference between modern and more remote experience in regard to the implication of joints in gunshot fracture of long bones. With the older type of bullet it may be said generally that the implication of joints amounted to a characteristic and specific feature. In more modern times, however, and with the modern types of bullet, a different state of affairs has arisen; and the latest view seems to be that the splintering of the shaft stops short of the cancellous ends, even sometimes when comminution is extreme, and, moreover, is not far distant from the joint.

The following reasons have been suggested for this phenomenon :

(1) The solution of continuity is so rapid with the small-bore bullet that the wedge action of the bullet is lost at once.

(2) The wedge being small does not separate the parts very far.

(3) The rapidity of the passage of the bullet minimises the period during which the expansive force acts.

(4) In conclusion, a short reference may be made to the so-called "explosive" effects of certain bullets used in the late war. That projectiles of such a nature were used is a subject which has been often dealt with. To the excited fancy of men in action it is possible that flashes of light on the impact of a bullet against a stone, or even small explosions in the air, may have occurred. But most of these stories must be received with caution, and I think there is no genuine evidence that explosive bullets in the form of minute shells were ever used. Moreover, I do not think that a bullet need necessarily be distorted or "mushroomed" to produce the typical "explosive" effect, though wounds produced by soft-nosed bullets show a very typical extent of laceration. I have seen over and over again results which convinced me that a simple Mauser bullet, intact in its envelope, is adequate to produce enormous destruction, and that by its mere energy of motion. All these three quoted cases might have been put down to "explosive" bullets, but there is not a particle of evidence

that the bullet was broken up in any way. To judge simply by the wound of exit is misleading. Fragments of bone in Case 3, for example, were found upon the man's coat, having burst through the skin in company with the bullet and a pulpy mass of muscular and other tissues. The resistance of the hard bony tissue tends to spread the area of impact, which at the point of striking is equal to the sectional area of the bullet, but may be enormously increased after penetrating the bone by the cone of hard material driven before it. A bullet which is soft and capable of deformation is more likely to lose its energy, and therefore its power of penetration, rapidly. Other things being equal, the harder the material of which the bullet is composed the more likely is it to be destructive, and at longer ranges. So that mere density will explain the effects of the Mauser bullet. A small, hard bullet does its work and disappears on the far side of the wound; a softer, expanding, or even exploding, bullet could not produce its effects without leaving some traces of its breaking up behind, and this is a feature which is relatively uncommon in this class of injury. So that there seems, on the whole, no reason to suppose that sporting bullets were used on a large scale to produce the severe wounds described above.

REPORT ON THE PRODUCTION OF VACCINE AT THE ARMY VACCINE INSTITUTE, ALDERSHOT.

By VETERINARY-MAJOR E. R. C. BUTLER.

Army Veterinary Department.

SUFFICIENT vaccine for 132,480 persons has been issued during the year ending March 31, 1903, of which 92,105 doses have been sent to the Army, and 40,375 to the Navy.

The total quantity supplied since the opening of the Institute is 978,203.

RESULTS OF VACCINATIONS AS SHOWN BY RETURNS RECEIVED DURING THE YEAR.

	PRIMARY						RE-VACCINATIONS			Total
	Infants			Others			Perfect	Modified	Failed	
	Perfect	Modi- fied	Failed	Perfect	Modi- fied	Failed				
Army (Home ..	1,985	298	323	1,385	337	125	43,673	22,601	7,119	77,846
Foreign	53	9	67	36	15	109	111	215	645	1,260
Navy	74	37	9	13	—	—	1,978	2,354	2,666	7,131
Totals	2,112	344	399	1,434	352	234	45,762	25,170	10,430	86,237

PERCENTAGE OF SUCCESSFUL VACCINATION.

					ARMY		NAVY
					Home	Foreign	
Primary—Infants .. ..	..	..	..	..	87·61	46·07	92·5
Others .. ..	..	..	..	..	93·34	31·88	100·0
Re-vaccination .. ..	..	..	..	..	90·31	33·58	61·91

Forty-two calves were used for vaccination, and *post-mortem* examinations were made after slaughter. Two were found to show traces of disease *post mortem*, and all lymph collected from them was destroyed.

On eight calves vaccination failed, or the lymph produced was not considered of sufficiently high quality for issue, and consequently destroyed.

The lymph was issued either in tablets or tubes, as desired by medical officers, in the following proportions :—

Tablets (sufficient for 5 or 10 inoculations), 21,969.

Tubes (sufficient for 1, 2 or 5 inoculations), 11,033.

The difficulties connected with the lymph during the spring and summer were greater than usual, and could not be attributed by either Vet.-Col. Moore or myself to any very definite cause. As such difficulties are, however, inseparable from the work, they call for no further notice than to say that they were surmounted, and at present all is satisfactory.

In consultation with the Director of the Medical Service Admiralty, the method of distribution to the Navy has been changed, the object being to ensure a more constant fresh supply than was possible under the former arrangement. I am also in communication with the Director-General, Army Medical Service, with the view to the introduction of a similar system for the Army.

The percentage of successes at foreign stations is very low, although constant endeavour is made to send the lymph satisfactorily, and special arrangements are made with the steamship companies to ensure it being carried in cool rooms. The difference in the results of the same lymph at home and abroad is as much as 60 per cent. During the past year there have been very few complaints as to the quality of the lymph, and in each instance the issue complained of was giving excellent results in many other hands.

Under this head I may venture to note that the personal element in successful vaccination, particularly re-vaccination, is very great indeed, and I quote two instances out of many that come to my notice :—

(1) In the same station, using the same lymph at the same time, one operator had 42 per cent., and another $4\frac{1}{2}$ per cent. of failures, both vaccinating 200 cases or more.

(2) During the year one operator, using seven different supplies of lymph, had vaccinated forty-two cases (thirty-one of which were primary), and reports thirty-one failures—about 76 per cent.

Another operator has a record of three failures in 1,000 re-vaccinations, or only 0.3 per cent.

These are extreme cases, of course, but this factor must always be reckoned with when the quality of lymph is called into question.

For the preparation of lymph, calves are purchased locally, preferably about three to four months old. Bulls and heifers are used indifferently. The animal is secured on its side to the operating table, and the upper hind leg raised and held by an



Showing method of preparing calf for inoculation and collection of vaccine.



Ripe vesicles on calf after inoculation.

To illustrate Vet.-Major BUTLER's paper.

assistant (see Plate). The abdomen and the insides of the thighs are then shaved, the area extending forward to the lower line of the ribs. The skin is thoroughly washed with white soap and hot water, and finally douched with sterilised water. The abdomen is next scarified in long parallel incisions about three-quarters of an inch apart and vaccine is run into each scratch with a thin metal blade. The animal is allowed to lie on the table for a few minutes to ensure the drying of the scarifications and is then taken to the stall.

Lymph is collected on the fifth day (120 hours). The vaccinated area is thoroughly washed as before, and finally douched with sterilised water and dried.

Each line (vesicle) is then scraped once with a sharp spoon. By scraping once only, all blood is avoided and the virulent material and unavoidable epithelium are alone removed. The method has the further merit of being the quickest and most humane. As it is scraped the lymph is received in a small porcelain jar, and is then mixed with twice its weight of chemically pure glycerine, and the whole is passed through a pulping machine to ensure thorough admixture. The result is a cream-thick vaccine, which is stored in sealed tubes.

The lymph is issued, as desired by medical officers, either (1) between glass plates, the edges of which are sealed by hard paraffin, or (2) in large or small tubes, into which it is forced by a small water blast pump, the ends of the tubes being subsequently sealed in a flame. Throughout the operations the lymph is neither touched with the hand nor brought into contact with chemicals (except glycerine). For antisepsis, absolute cleanliness is general, and in detail is relied upon in preference to any chemical agent.

Glycerinated lymph has been issued by this establishment since 1889. Long previous to this date it was known that the admixture of glycerine produced an easily manipulated pulp which gave good results. The matter is discussed by Warlomont ("Animal Vaccination," 1883, trans. 1885), and he credits the Vaccination Committee of Milan with being the first to establish the method, and a modification was introduced by him (glycerine and water) into Holland. In 1892 St. Ives Menard and Chambon (Paris) noted that storage in glycerine for a considerable period gave excellent results, and in the same year Monckton-Copeman first demonstrated that the reason for this was the inhibition of

the growth of extraneous organisms. The matter has since been more fully investigated (Monkton-Copeman, Blaxall, Fremlin), and it is now well established that the power of growth of the many extraneous organisms which are found in all lymph at its collection is inhibited by storage in glycerine, whilst the activity of the lymph for vaccination is unimpaired.

The practical outcome of this is that the lymph which has been stored in glycerine for, say, a month produces good vaccination results, without the accompanying severe inflammation which is sometimes noted from lymphs prepared without glycerine.

In the case of babies this is particularly noticeable; among re-vaccinated recruits and soldiers it is not so evident, as their arms may become swollen and inflamed by working during the vaccination period or by the wearing of tight jerseys or dirty clothes; but even then such cases are infrequent.

The extraneous organisms found in lymph are numerous, and a very long list might be cited of those that have been observed from time to time. They are unavoidable, but strict precautions as to cleanliness reduces the number of varieties present. The most numerous and constant are *Staphylococcus pyogenes aureus*, *Staphylococcus pyogenes albus*, *Staphylococcus cereus albus*, *Bacillus subtilis*. A systematic series of bacteriological examinations of all lymph collected and glycerinated has shown the germicidal effect of the glycerine to be so marked, that from a lymph which soon after collection contained large numbers of bacteria, practically no micro-organisms can be obtained after a month's storage.

CLINICAL URINARY ANALYSIS: A CRITICAL STUDY.

BY CAPT. J. C. B. STATHAM.

Royal Army Medical Corps.

THE importance of the subject supplies me with the best reason I can urge for introducing this somewhat technical paper into the Journal.

The urine, in whose nitrogenous constituents are contained nine-tenths of the nitrogen excreted by the body, and in which the final chapter of the story of nitrogenous body metabolism may be read, does not appear to have received that attention in England which its importance demands. How often one hears the expression used "the urine was normal" or "the urine showed nothing," when only a simple qualitative test for sugar or albumen in the urine had been made. How hasty and misleading such conclusions may sometimes be is evident when we remember that both sugar and albumen may be absent and yet the urine be gravely abnormal, reflecting perhaps profound disturbance of the body metabolism.

A normal urine is one which not only contains no abnormal products, but one in which the normal constituents are proportionately represented, and excreted in quantities proportional to the individual who excretes them. It is because such is the case that quantitative urinary analysis has value in clinical work, and a knowledge of the quality of the urine becomes an asset in diagnosis and prognosis neither negligible nor unimportant.

So long as our conceptions of quantitative urinary analysis were limited to either the long and laborious processes of the laboratory, when an endeavour was made to obtain extreme accuracy for research purposes, or to the simple but generally inaccurate or misleading "clinical methods," the difficulty of making a urinary analysis practical and of real utility was very great. Experience and research, however, have suggested accurate yet rapid processes, and we appear to have reached a point where quantitative urinary analysis may become a practical help in the diagnosis and prognosis of disease.

As illustrative of the unsuitability of the pure laboratory

method and the inaccurate so-called clinical method of quantitative estimation, I will give two examples, one of each, taking urea as the urinary constituent estimated.

A clinical method of urea estimation one often sees employed, is as follows : 2 or 5 cc. from a sample of urine (generally morning urine) are mixed with some hypobromite of soda solution in a small Doremus ureometer, graduated in percentage of urea, the nitrogen evolved in the process being read off in these percentages. The sources of error in such a process are many : (1) If the urine has been taken from an isolated micturition, its urea percentage gives us no idea of the urea percentage in the cyclical urine, for the richness of the urine in urea may be three or four times as great after a meal, or when the urine is concentrated, as it is in the morning urine ; (2) the hypobromite solution, if not carefully and freshly prepared, may not evolve all the nitrogen of the urea, or may itself evolve oxygen and so vitiate results : the hypobromite solutions used in routine clinical work are not always above reproach ; (3) the nitrogen of other bodies besides urea is liberated by the hypobromite solution, approximately one-third of that of the uric acid and kreatinine, and all the nitrogen of the ammonia present. The hypobromite solution also only liberates 92 per cent. of the nitrogen of urea, unless sugar be present. These two sources of error are not allowed for, because one is supposed to balance the other. This rule is approximately true for normal urine, but quite untrue and misleading when applied to some abnormal urines, in which the nitrogen of the extractives and ammonia may rise to 20 or even 30 per cent. of the total nitrogen, as in diabetes ; (4) no allowance is made for the influence of temperature or pressure on the volume of the gas ; the effect of the former is sometimes considerable. This then is the so-called clinical method of estimating urea—a method so inaccurate as to be not only useless but misleading.

Perhaps the best known and one of the most accurate of laboratory research methods of estimating urea is that of Moerner and Sjöeqvist ; but this process takes all one night and half of the next morning to complete, and consequently could only be used when time was no object. I hope to show, later on, that it is possible to estimate the urea in a reasonable time and, too, with a reasonable degree of accuracy.

I have used the expression "laboratory process" when speak-

ing of Moerner's method of urea estimation, in the sense that it is essentially a method used in research work only; for all quantitative processes must necessarily be laboratory ones though the laboratory be but a modest affair.

For general convenience this paper on urinary analysis has been divided into two parts. The first part is devoted to a description of the schemata employed, with notes upon the methods of analysis adopted; while in the second part, which I hope will appear in a future number of the *Journal*, it is proposed to consider some work which has been carried out by myself and others in France on similar lines and by methods analogous to the ones described.

On p. 195 is shown a draft form of an analysis report, which I have prepared, and which is based on analogous forms in current use in France. In this form of report are two schemata or graphics; some explanation of these graphics will be found on the form itself, but in order to elucidate matters some further explanation of them may be desirable. Such a form as this might be used with advantage in obscure or interesting cases, especially when nutritional disturbance has been a marked feature, particularly as it could be attached to an invaliding report or case book. The form is not so complicated as it may appear at first sight, for every effort has been made by the free use of graphical methods to render results which would otherwise be merely a collection of figures, striking and easy to understand.

Roughly speaking, this form may be divided into two halves. The schema or chart on the left hand side of the paper is intended to be used mainly for chronic cases, and the information noted about height, weight and chest measurements is of special value in such cases. This chart deals with both the quality and the quantity of the urine excreted. The schema on the right hand side of the report form is intended to be used when the analysis is made in a case of acute disease. It may be also employed, to any desired extent, for chronic cases. It illustrates only the quality of the urine.

The specimen report form given has been completely filled in for purposes of illustration. So complete an analysis would only rarely be required. The time spent on this analysis was four and a half hours. Two hours is generally sufficient for an analysis as usually carried out for ordinary cases.

The chart on the left hand side is intended for chronic or convalescent cases ; it is so restricted because an endeavour is here made to estimate the amount of the urinary output for the twenty-four hours, as well as its quality, and to furnish a normal standard for each individual case based on body-weight and other factors ; these are data not to be obtained generally in cases of acute illness, and would be of doubtful value if they could.

The chart just referred to is adopted from Gautrelet, of Vichy, who introduced it. Gautrelet argued that if the cyclical urine of a certain number of young, healthy and well-proportioned people, living under ideal hygienic conditions, were collected and examined over a period sufficiently long to exclude accidental error, a normal standard of urinary excretion per kilogramme of body-weight could be formed, and that, by calculating the number of active or functional kilogrammes in every individual case, the one amount multiplied by the other would give the normal or ideal urinary cyclical output for the individual concerned. Experiments had been carried out some time previous to this by the French army surgeon, Peyraud, of Lebourne, on the correct proportion of weight to height, &c. Great numbers of healthy young soldiers were examined and the average worked out. Gautrelet adopted Peyraud's figures for his schema, which practically worked out that the weight in kilogrammes would be four-tenths of the height in centimetres, and one and three-fifths the interacromial measurement. The cyclical urine of twelve healthy French peasants of Burgoyne, of both sexes, ageing from 30 to 35 years, fulfilling the necessary requirements of weight to height, and living under almost ideal hygienic conditions as to food, temperature and exercise, was examined for eight days, and the average urinary output for the twenty-four hours per kilogramme of body-weight estimated. This amount, which worked out to 24 cc. of water, 1 gramme of extract, 0.5 gramme of urea, 0.1 gramme of chlorine, 0.005 gramme of phosphoric acid (in terms of P_2O_5) 0.001 gramme of uric acid and 0.001 gramme of urobilin was adopted as the standard or urological unit. The acidity equalled 0.84 cc. normal alkali solution or 0.03 gramme P_2O_5 per kilogramme. One factor in determining the normal standard for the individual had now been acquired, and if quantitative analysis had only to deal with healthy well-proportioned people of from 30 to 35 years of age, living

REPORT OF URINARY ANALYSIS.

NAME—J. S.

DISEASE—Chronic Dyspepsia.

AGE—30. WEIGHT—65 Kilow. HEIGHT—1 Metre 70.

INTERACROMIAL MEASUREMENT—39 Metre

ANTERO-POSTERIOR DIAMETER OF CHEST—21 Metre.

(3) BIOLOGICAL COEFFICIENT—67.

DIET—Mixed, Full.

TREATMENT (Drugs)—Nil.

PHYSICAL CHARACTERS OF URINE.

COLOUR—Citron Yellow. DEPOSIT—Flocculent (Mucus).

ASPECT—Limpid. ODOUR—Sui Generis.

REACTION—Acid. DENSITY AT 15°C—1014.

POLARIMETRIC DEVIATION— -1°

POINT OF CONGELATION—Not Taken.

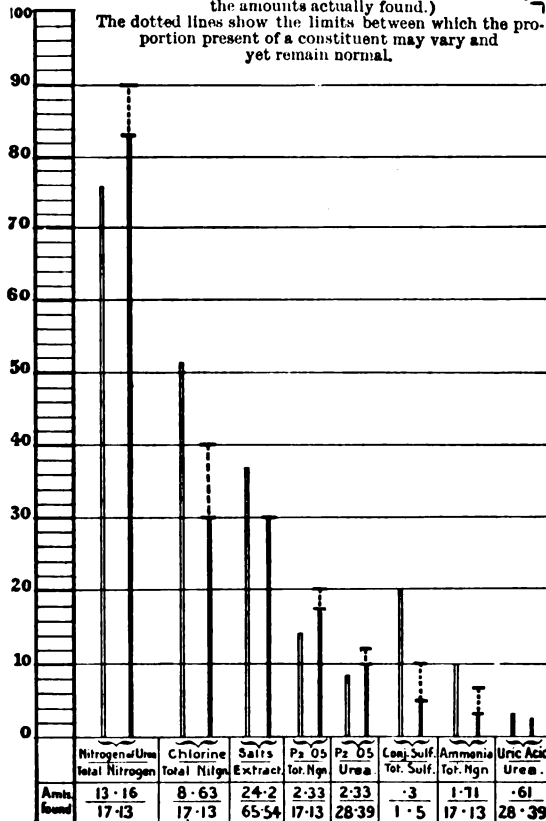
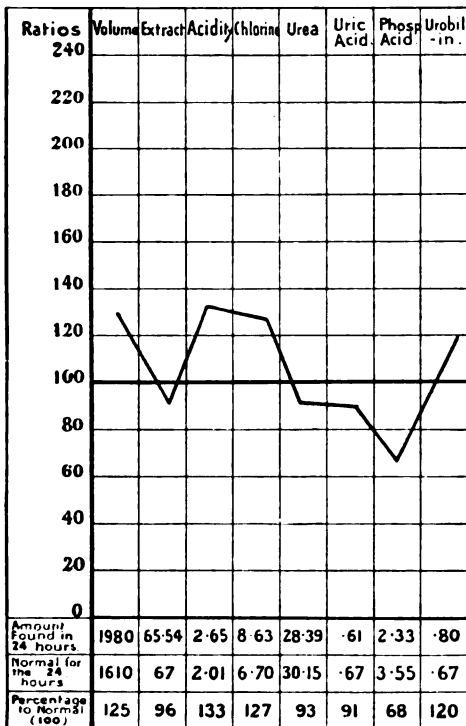
CHART OF RATIOS OF URINARY CONSTITUENTS.

(Black columns denote the normal, double columns the amounts actually found.)

The dotted lines show the limits between which the proportion present of a constituent may vary and yet remain normal.

(2) CHART OF URINARY OUTPUT OF THE PATIENT FOR THE 24 HOURS.

(And the percentages of the constituents to normal.)



MICROSCOPICAL AND BACTERIOLOGICAL EXAMINATION.

QUALITATIVE EXAMINATION.—ABNORMAL PRODUCTS.

ALBUMEN— { Globulin.
Serin—Traces.
ALBUMOSES—Traces.
PEPTONES—Nil.
BILE SALTS—Nil.
B. PIGMENTS—Nil.
SUGAR—1 gr. in 24 hrs.
ACETONE—
DIACETIC ACID—
B OXYBUTYRIC ACID—
INDICAN—Increased.
SKATOL—Increased.

Few Oxalate of Lime Crystals.

Urate of Soda.

Hyaline Cast (very few present).

REMARKS.

The analysis shows the condition of the patient to be mainly hepatic and gastro-intestinal. The high urinary acidity and urobilin present point to the liver being affected (functional insufficiency), while the increased proportion of conjugated sulphates and particularly skatol and indican indicate excessive intestinal putrefaction. The increased ratio of ammonia present is probably due to an increased absorption of acid products from the gastro-intestinal tract, needing neutralization, and diverting the ammonia from its normal course, viz. to form urea. The small amount of sugar present is due probably rather to hepatic insufficiency than to any more vital cause. The presence of traces of serin and albumoses and a few hyaline casts is possibly due to nutritional disturbance temporarily affecting the kidney and not to organic kidney disease.

NOTE.—1. Metric weights and measurements are used in this report. 2. The chart on the left hand side of this report is intended to show the quantity as well as the quality of the urine, and is only filled in in chronic or convalescent cases, the information concerning height, weight, &c., being necessary only in such cases. The normal used in this chart varies with the individual; it is found by multiplying the output which each healthy kilogramme of body weight is known to excrete by the biological coefficient. 3. The biological coefficient is found by taking the mean between the actual weight and the theoretical weights for height, and chest measurement, age, diet, are also allowed for.

under healthy conditions, there would have remained only the determination of the other factor or weight. But it was at once seen that weight alone could not be adopted as the other factor in estimating the normal standard for the average patient who came to Vichy, for he might be very fat and short, and, as fat does not play so active a part as muscle in nitrogenous metabolism, any normal found by multiplying the kilogramme output by the weight would in this case be too high and misleading; or the patient might be thin and muscular, when the opposite would be the case. Again age had to be allowed for, a youth, say, of 15, would not be expected to weigh four-tenths of his height, although this deficiency is somewhat counterbalanced by the greater intensity of metabolism in the young, causing a proportionately high urinary output.

Food, too, which plays so important a part in any calculation of urinary output, had to be taken into consideration. It was with a view to reducing the amount of error from these many sources that the following principles were adopted in estimating the second factor of the two necessary to ascertain the individual normal. A mean is taken, between the actual weight and the theoretical weights for height and chest measurement, with a view to correcting the influence of ill proportion or excessive fat; the influence of age is calculated on the mean or average thus found. Thirty is adopted as the age at which growth has ceased and metabolism become stable, and no allowance made if the patient is of this age; half the difference between the actual age of the individual and 30 is deducted from or added to the height-weight mean which has been found for patients below or above this age. This rule is only followed between the ages of 18 and 45; other rules govern the cases of very young and old persons. The figure resulting from the calculations of height and weight, influenced by age, is the second factor in the attempt to form a normal individual standard; this factor has been called the "biological co-efficient" and represents in an approximate way the number of active kilogrammes of body-weight.

The "individual normal" is then deduced by multiplying the urinary output, per kilogramme, by the biological co-efficient. The amount so found is not affected if the patient is on an ordinary mixed diet, but the result is multiplied by 1.75 if a purely nitrogenous diet is being taken, and by 0.66 if no diet is being taken at all.

I have described this method of Gautrelet's at some length, as it is an ingenious attempt to solve an extremely difficult problem, and because it is the system on which the normals have been found in the schemata, to be given later on, and which are identical with the one on the left hand side of the suggested form of report. The method lends itself to criticism and has obvious defects; but as the same system has been applied to all the cases, the results have probably not been materially affected. To obtain an absolutely accurate standard for each individual is, I am convinced, quite impossible, even if the greatest care were taken in estimating the food intake, body weight, &c., of the individual. We have always to deal with the difference between man and man, that is, the difference of individual metabolic intensity. It is for this reason that I have described the simplest of the two methods given by Gautrelet, for estimating the normal standard. Gautrelet, in a further endeavour to achieve the impossible—an accurate and absolute individual standard—fills the paper with calculations, including a great many body measurements. The method has but to be seen to be condemned as impracticable; while it is doubtful if it is more accurate than the simpler method. Yet it is on a normal so obtained Gautrelet endeavours to dogmatise and draw conclusions from deviations, however slight, from the normal. Bouchard has gone to even further lengths in an endeavour to find an absolutely accurate normal standard, arguing that it is only the fixed albumen of the tissues which is the active agent in nitrogenous metabolism; he seeks to estimate the amount of this in each individual case. Pages and pages of one of the volumes of the last great work on pathology in France are filled with abstruse calculations, allowance being made for, among other things, the bony framework and the skin surface.

The question then arises, Is such a graphic system of illustrating the urinary output, and having for its unit of comparison a normal so open to error, of any value at all? The answer must be decidedly in the affirmative, if the system be applied to the right class of cases, and it be clearly recognised that the results must always be relative rather than absolute, with more attention paid to the relation of the curve of the output to itself than to its position with respect to the normal line. In Gautrelet's system no difficulty exists in finding the urinary output per kilogramme

of weight. The difficulties of the system and its weak points are made evident when the second factor of the normal standard—the biological co-efficient—is estimated. They are as follows : (1) Insufficient allowance made for differences in the urinary output at different ages. In children and very young people the output of urinary constituents per kilogramme is much higher than in the adult, and for these young people it is almost impossible to obtain even an approximate normal standard. (2) The difficulty in estimating and allowing for the influence of excessive fat in the individual ; for it is doubtful if such an arbitrary remedy as taking the mean between the actual and theoretical weights really overcomes this difficulty. (3) The insufficient and rather arbitrary allowance made for the influence of food, and the doubt which arises as to whether in private practice, where the system was used, sufficient allowance could be or was made for the food taken by the patients.

It may be opined that few of these difficulties would exist in any application of the system to the soldier, for here all the cases examined would be drawn from young men between the ages of 20 and 30. No special body measurements would be necessary, such as those which have been devised to meet the case of patients who go to Vichy or similar watering places, and who are often very corpulent, and whose weight is not a good index of their active tissue. In other words, for routine army work, physical details other than body weight might be ignored.

In the case of the soldier, the influence of the diet taken could easily be calculated in terms of carbon and nitrogen, as the dietaries are more or less fixed and their nutritive value known. In short, if the urinary output per kilogramme of body-weight were calculated by taking the cyclical urine of a number of healthy men for a period of days, the nutritive value of their diet being known, and the output per kilogramme for twenty-four hours adopted as the standard unit, the normal of any case could approximately be found by multiplying this amount by the number of kilogrammes which the patient weighed. The influence of the food taken by the patient on the result, being allowed for, such a method as this would be a simple one with strictly limited applicability, it could only be used for the soldier whose normal has been determined. The reason it can be used at all is because the men are mainly of an age (20 to 30) when metabolic intensity

does not vary very greatly. I do not think it is possible to devise a satisfactory system for use with children, owing to the great difficulty in fixing a normal. The urinary output per kilogramme varies so greatly at different ages up to 20 that a normal would have to be found for each year of life.

With the modifications above described we could have a simple and approximately accurate method for working out urinary analysis in the army, the graphical method employed rendering the results more striking and interesting, and, above all, we would have some organised system on which to work and compare results, a most important point. The results found would be relative, and greater attention would need to be paid to the shape of the curve of the constituents than to the position of that curve to the normal line. That such a system as has been described is sufficiently accurate will be readily seen when it is shown how the influences of disease on metabolism and on the urinary output are so marked as to overshadow small errors.

The schema on the right side of the report form is easy of explanation. The dark columns denote the normals, while the light double columns show the amounts actually found. It will be noticed that the "normal columns" are broken towards their upper ends; this is intended to show the limits between which the constituent concerned may vary and yet remain in normal proportion, for it is impossible to draw hard and fast lines. This graphic representation would generally be the only one filled in in acute cases, while being filled in to any desired extent in chronic cases.

The rest of the report-form presents no difficulty; a description of the physical characters of the urine occupies one corner and the results of the qualitative analysis for abnormal products another, while the microscopical or bacteriological results are suitably represented. Finally, a short space is left for remarks which might be filled in by the person analysing the urine, and be of use to the doctor in charge of the case.

Having, so far, considered general principles, I propose now to give a brief account of the methods employed for the analysis of each constituent of the urine, taking them in the order in which they come in the suggested scheme. Before doing so, however, I would like to draw attention to certain burettes with which most of the work can be conveniently done, and which are shown

in the accompanying photograph. These burettes are self regulating, and are the invention of Dr. Huguet, Professor of Chemistry in the University of Claremont Ferrand in France.

The bottle of the burette is filled with the re-agent to be used. The burette bottles in the photograph are filled with (1) deci-

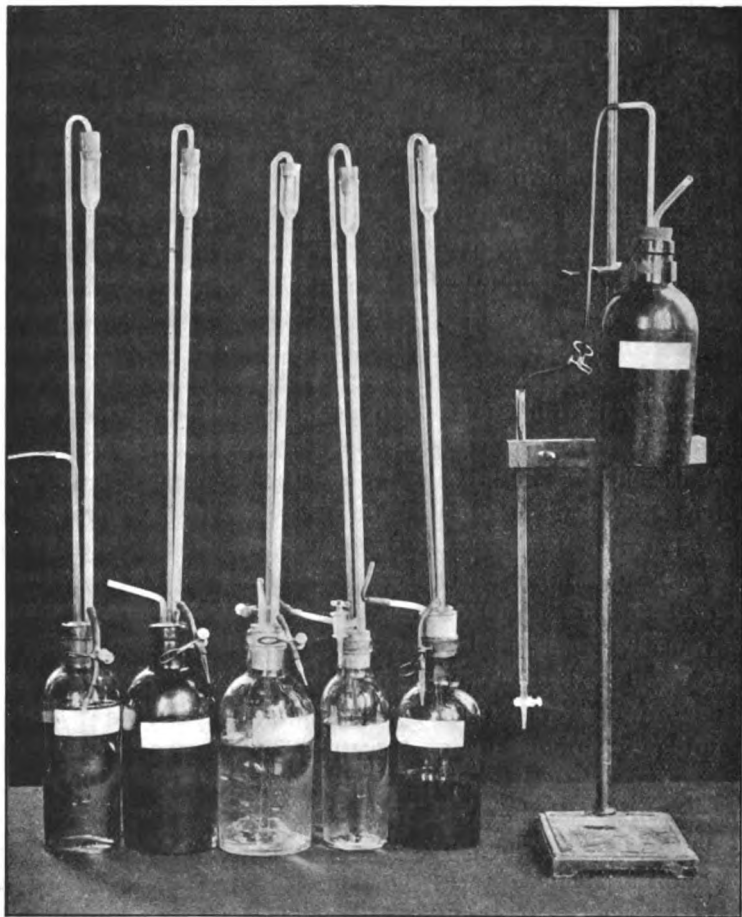


FIG. 1.

normal alkali solution to test acidity; (2) decinormal nitrate of silver solution for chlorides; (3) decinormal acid solution for alkalinity; (4) nitrate of uranium solution for phosphates; (5) a solution of copper for the estimation of the urates.

By blowing down the small tubes seen jutting out horizontally just above the cork, the fluid in the bottle of the burette is forced up through the feeder-tube into the graduated burette tube; by a simple arrangement, syphon action is brought to bear as soon as the fluid reaches the zero mark of the burette, so that the fluid must always remain at this point. The burettes are sufficiently accurately graduated and clearly marked that an amount up to one-hundredth of a cubic centimetre can be read off, if desired. A great deal of time and labour is saved by the use of these burettes, for with them a quantitative analysis of the acidity or alkalinity of the urine, together with the chlorides, phosphates and uric acid, can be carried out in half an hour.

The apparatus shown on the right hand side of the photograph is one improvised by means of a bottle and ordinary burette; this gives as rapid results as the Huguët burettes, and can be easily put together.

NOTES UPON METHODS EMPLOYED.

It would be quite impossible to describe all the methods used by different workers for obtaining details for the suggested form of report. But, as a rule, the methods employed have been on similar lines to those about to be described here, and when this is not the case the fact will be mentioned. It will be convenient to consider the methods under the following heads.

Volume.—The urine analysed has always been that of the twenty-four hours—analytical results based on isolated samples are misleading, as the quality of the urine varies greatly at different periods of the day. To prevent decomposition of the urine, a little cyanide of mercury, chloroform or ether is placed in the collecting vessel.

Extract.—In all the schemas this has been estimated by evaporation and drying at 100° C. This method is not absolutely accurate, owing to the volatilisation of certain substances in the extract at this temperature. Latterly I have used the densimetry method for estimating the extract, the specific gravity being calculated with great care to four places of decimals and the last two numbers multiplied by 2.33. This gives rapid and sufficiently accurate results.

Acidity.—The acidity of the urine is estimated by means of a decinormal alkaline solution, the process being continued until

an alkaline reaction is given with neutral litmus paper, the results being given in terms of anhydrous phosphoric acid (P_2O_5); this method is the one adopted by Gautrelet. By giving the amount of acidity in terms of phosphoric acid some comparison may be made with the total phosphates. I have latterly also estimated the acidity by Folins' method, which estimates the mineral and organic acidities separately; but this method was not used for all of the charts to be given in the second and further part of my paper. Acidity being the normal condition of the urine, it alone is allowed for in the graphic representation of percentages. Should the urine be alkaline, the alkalinity is estimated by a decinormal acid solution, and the cause of the alkalinity determined.

Total Nitrogen.—This is determined by the well known Kjeldahl method, the oxidiser used being peroxalate of potassium. Very simple and cheap apparatus can be bought or may be constructed from laboratory apparatus for this method.

If rapid results are required, a Kjeldahl-Henniger-process is employed. This consists in neutralising the acid ammonium sulphate formed during the first part of the Kjeldahl process and decomposing the neutral ammonium sulphate in a ureometer, instead of distilling it over into a decinormal acid solution as is usually done. The Kjeldahl-Henniger-process gives accurate results only if great care has been taken not to render the ammonium sulphate alkaline, or to prevent the great heat evolved during the process by keeping the vessel used in the process in cold water.

Urea.—A considerable amount of time has been devoted to endeavours to find a rapid and accurate process for the estimation of urea. Nearly all the better known methods have been tried and rejected either because they were inaccurate (Liebig's method and its modifications and the unmodified hypobromite process), or because they were long and complicated (Moerner, Braunstein, Folins, and Bohland's methods) and had no clinical value. The hypobromite method is by far the simplest of all urea processes, and eminently suited for clinical work; but owing to the manner in which it is almost invariably carried out in England it is so inaccurate as to be worthless. Earlier in this paper I expressed several reasons why this process was inaccurate, but as the method I have adopted, and am about to describe, is based on the hypobromite process, I may recapitulate them.

(1) The nitrogen of other bodies beside the urea is liberated

by the hypobromite solution. In a number of experiments carried out by reacting on solutions of some of these bodies with hypobromite, the following results were obtained: Uric acid evolved from 25 to 45 per cent. of its nitrogen, kreatin 50 to 70 per cent., kreatinin 30 to 40 per cent., and ammonia salts gave up all their nitrogen in contact with the hypobromite, while no gas could ever be obtained from hippuric acid. The smaller percentages quoted in each case were obtained when no glucose had been added to the solution under examination, while the higher percentages were obtained by the addition of glucose, and by violent agitation of the hypobromite and experimental solutions. These results are not dissimilar to those obtained by Falck and other observers.

(2) No allowance is generally made for temperature, which so greatly affects the bulk of gases.

(3) The use of bad ureometers and the want of care in the preparation of the hypobromite solution. The method adopted, which retains the use of hypobromite and at the same time overcomes the objections just mentioned, is as follows: All the nitrogenous bodies of the urine, except the urea, are precipitated by a solution of phosphotungstic acid (in excess), acting on a urine acidulated with hydrochloric acid. To 20 cc. of urine are added 2 cc. of a 10 per cent. solution of hydrochloric acid, and the mixture made up to 60 cc., with a 9 per cent. solution of phosphotungstic acid. The mixture is allowed to stand for half an hour and is then filtered; 15 cc. of the filtrate, which represents 5 cc. of urine, is reserved for use with the ureometer.

Sallerin Donzé and Lambling have shown that uric acid, kreatin, kreatinin, the xanthin bodies, and ammonia salts are precipitated from the urine by phosphotungstic acid, and though I have been able to recover minute traces of ammonia from a phosphotungstic filtrate by Shaffer's method, this does not militate against the fact that for practical purposes the ammonia is completely precipitated. As phosphotungstic acid in greater strength than 11 or 12 per cent. precipitates small quantities of the urea, 9 per cent. has been fixed upon as a convenient strength, and by using two volumes of the acid to one of urine one can always be sure of having an excess present.

Fifteen cc. of the filtrate are placed in one of the legs of the A shaped tube attached to the ureometer in fig. 2, and a solution

of hypobromite of soda placed in the other. The gas evolved when the two solutions are mixed is read off and noted when contraction has ceased. This result, when compared with the amount

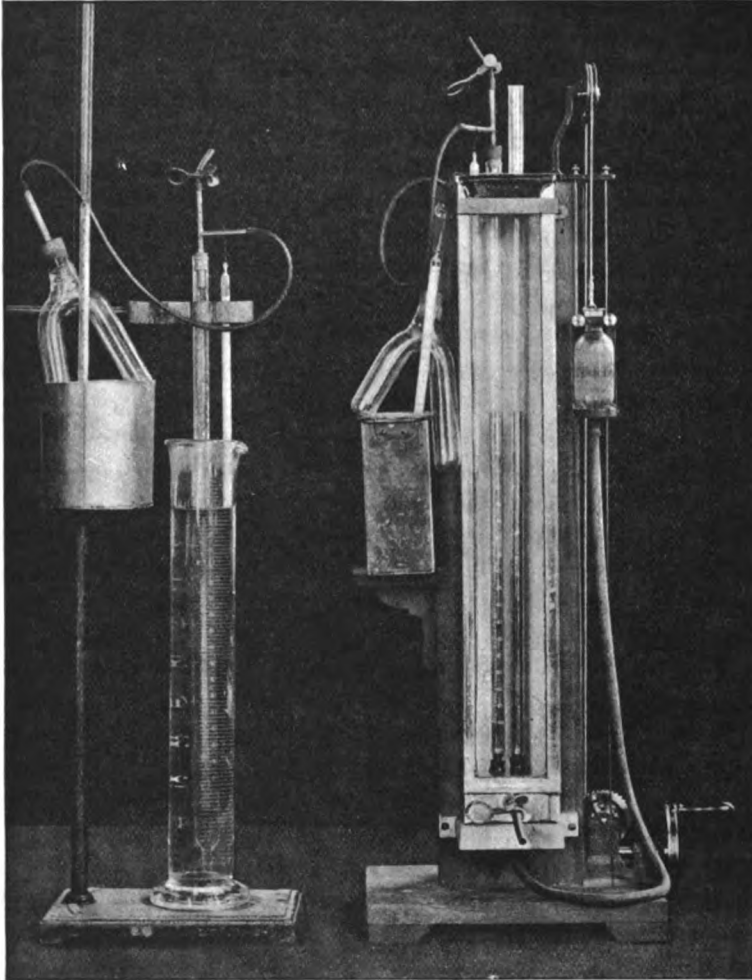


FIG. 2.

of gas given off by 5 cc. of a 2 per cent. solution of pure dried urea—under exactly similar conditions of temperature—gives the amount of urea per litre in the urine.

In the accompanying fig. 2 will be found illustrations of the

two ureometers used in the urea estimations. The one on the right-hand side of the figure has been constructed by joining two burettes together with a Υ shaped tube and connecting the lower arm of the same tube to a movable reservoir of mercury by means of a piece of rubber tubing. The Λ shaped vessel in which the reaction between the hypobromite and urine solutions takes place is attached to the upper end of one of the burettes by a \perp shaped tube and a piece of rubber. Both the Λ shaped reaction tube and the burettes are placed in water boxes containing thermometers. The ureometer just described has been placed on the stand of a Mercier's instrument ; but a simpler stand can be easily made.

The ureometer on the left of fig. 2 is of simple construction, and has been made up out of laboratory apparatus. It needs no explanation.

The advantage of ureometers such as these is that all the gas-holding apparatus is surrounded by water which can be brought to the same temperature before the gas, evolved by (1) the urea solution or (2) the urine, is read off. The temperature of the gas being the same in both cases, no allowance need be made for it, thereby avoiding troublesome calculation.

I have given up using glucose—which increases the amount of nitrogen evolved by the urea—and although only 92 per cent. of urea nitrogen is evolved by hypobromite alone, this does not influence the result, which is a comparative one between a pure urea solution and the urine examined. Glucose by evolving heat complicates matters.

The hypobromite solution is prepared by adding equal parts of a 40 per cent. solution of caustic soda and a mixture containing 10 cc. of bromine dissolved in 100 cc. of a 15 per cent. solution of bromide of sodium. This is used only when freshly prepared.

The urea process just described takes twenty minutes to complete (excluding the time taken for precipitation), it is simple of execution, rapid and accurate. In my hands it has given very satisfactory results in a long series of estimations.

Chlorine.—This is estimated by Mohr's process as modified by Pribram. The modification consists in the destruction of urinary organic matter, which otherwise combines with the silver nitrate solution and vitiates the results. The organic matter is got rid of by heating with sulphuric acid and permanganate of potassium.

Uric Acid.—This is estimated by Gautrelet's modification of Arthand and Butte's method, the re-agent used being a hyposulphite of copper, and the indicator ferrocyanide of potassium with hydrochloric acid. The process is simple, very rapid, and gives fairly accurate results. It is the method used in most of the charts to be described.

When it is necessary to estimate the uric acid with great care, Denigès's method, which has been adopted as the standard method

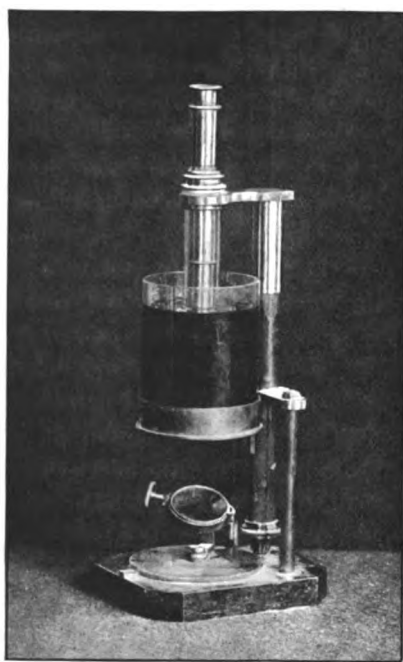


FIG. 3.

in France, and for which very accurate results are claimed, is used in this process also. Copper hyposulphite is the re-agent used, and the amount of uric acid in the urate of copper which is formed being estimated by means of a cyanide.

Phosphates.—These are estimated by the nitrate of uranium method, the indicator used, however, being that recommended by Mercier, viz., tincture of cochineal, which appears to give better results than the ferrocyanide of potassium drop method.

Urobilin.—This pigment is estimated spectroscopically, the instrument used being Gautrelet's uropigmentometer. This instrument is illustrated in the accompanying photograph (fig. 3), and consists of a spectroscope held vertically into a glass vessel filled with the urine to be examined and placed on a stand. By turning a screw on the instrument, this vessel can be raised or lowered at will, thus decreasing or increasing the depth of the layer of urine examined; the movement which raises or lowers the glass vessel also turns a disc at the bottom of the stand, which automatically registers the depth of the liquid thus produced. As soon as the spectrum of urobilin—a dark absorption band near F—is seen, the depth of the layer of urine is noted. A calculation table accompanies the instrument, from which one can estimate the amount of urobilin per litre.

A good deal of the urobilin of the urine when freshly emitted exists as a colourless chromogen, and it is sometimes almost impossible to detect the characteristic spectrum in such a case. On exposure to the air, however, this chromogen becomes converted into urobilin, completely according to some, partially so according to others. In the urine of twenty-four hours a band can always be seen by anyone used to spectroscopic work. To intensify the absorption band, Denigès of Bordeaux employs a solution of iodine in iodide of potassium, which is supposed to act by oxidising the chromogen to urobilin. I have adopted this method latterly, using 1 cc. to 100 cc. of urine. In the charts, however, to be given, the urobilin has been estimated directly.

Ammonia.—This is estimated by Shaffer's method. This method consists in driving off the gas by boiling it with an alkali *in vacuo*, the boiling point, considerably lowered by the condition of vacuum, being further reduced by the addition of methyl alcohol to the urine. The mixture thus formed boils at from 40° to 45° C., and as urea is not broken up till a temperature of 60° C. is reached, the results are not liable to be vitiated by ammonia so derived. The accompanying photograph illustrates the apparatus (fig. 4).

The boiling is carried out in a water-bath, and the small bulbs are used to prevent the alkali being carried over to the small flasks which contain the decinormal solution of sulphuric acid, into which the ammonia is received. The amount of ammonia present is estimated by the loss in acidity of this decinormal acid; each cc. of acidity being equal to 0.0017 gramme

of ammonia. The vacuum is produced by the use of an inexpensive water-suction tube, the degree of vacuum produced being shown by the large U-shaped pressure-tube placed on the white millimetre card (the process should be carried out at a

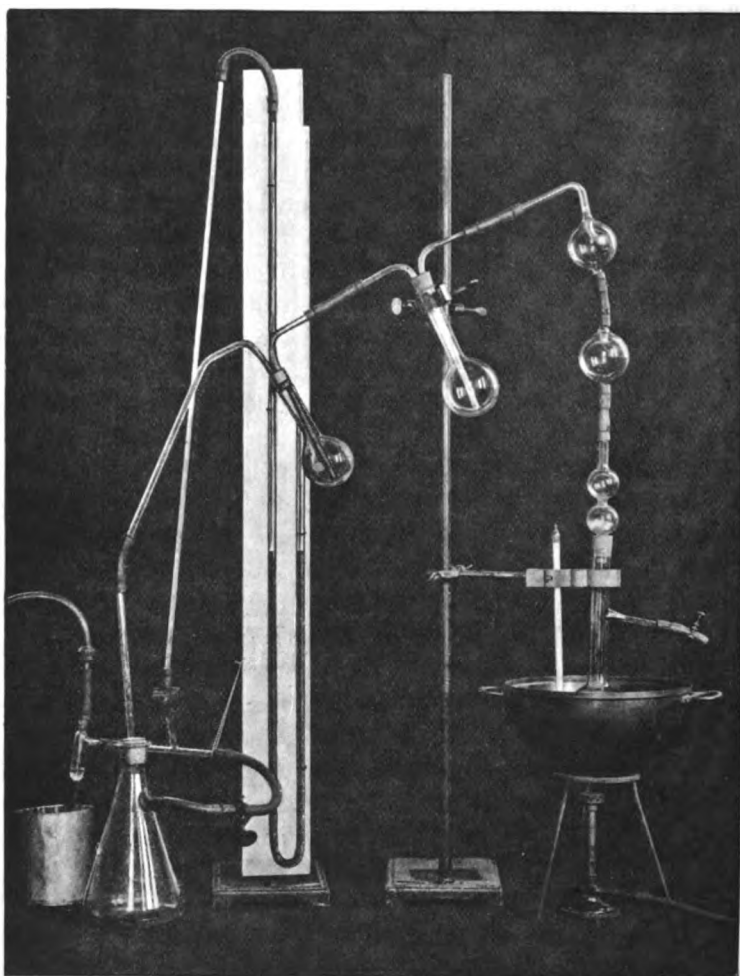


FIG. 4.

pressure of 10 millimetres of mercury). The apparatus thus set up is simpler than it may appear at first sight ; it is inexpensive and gives very accurate results ; it can be fitted up anywhere

if a sufficient pressure of water can be assured. The apparatus shown in Shaffer's description does not give very satisfactory results—the one in the figure has been modelled on one set up by Dr. Beddard in the Guy's Hospital laboratories, and I owe it to his advice that I have escaped the inevitable trouble inseparable from work with new processes.

Sulphates.—These are estimated by Salkowski's gravimetric method.

Some of the methods employed for the qualitative and quantitative analysis of abnormal products in urine which occupy a place in the report form may be briefly referred to. *Albumin* is estimated quantitatively by the gravimetric method, though, if a Purdy's centrifugaliser be present, the centrifugal method is greatly to be preferred. Qualitatively, Borreau's reagent—sulphophenic and sulphosalicylic acids—has been used in addition to the ordinary tests, as it is so delicate. *Sugar* is estimated by Gerard's cyano-cupric method. *B-Oxybutyric acid* by the polariscope, i.e., by reading the polarimetric deviation caused by the substance in solution *plus* the sugar; the quantity of the latter being known and also its effect on polarimetric deviation, the amount of B-oxybutyric acid can be readily calculated by difference.

The methods adopted for the albumoses, peptones and acetone, and the qualitative tests for albumin, sugar, bile acids and pigments are those usually adopted and described in all text books on urine. It will be noticed that with two exceptions the processes noted as being used are rapid processes. These exceptions are the gravimetric methods of estimating the sulphates and albumin. Purdy has shown conclusively, however, that with carefully arranged centrifugal methods both the sulphates and the albumin can be estimated with great rapidity, and with an accuracy quite sufficient for all clinical purposes. I hope in future work to be in a position to employ these methods. The ratio of the constituents to each other, as shown in the schema of columns and the percentage amounts of the constituents of the urine to the calculated normal, are easily found, once the amounts actually present have been estimated.

For further information about the procedures mentioned, notably the methods of estimating the acidity and alkalinity of the urine, and the amount of chlorides, phosphates, sulphates, sugar and albumin, any standard work on urinary chemistry

may be consulted; but for the information of those interested in this subject, I submit a short bibliography. The practical application of these methods in actual cases of disease, with comments upon their values, will be given in a subsequent communication.

BIBLIOGRAPHY.

- ALLEN. "Chemistry of Urine." Churchill, London.
- CAMPBELL BLACK. "The Urine in Health and Disease." 1895.
- DENIGÈS. "*Chimie Analytique*." A. Storck et Cie., Paris, 1902.
- DONZÉ and LAMBLING. *Comptes rendus de Société de Biologie*. May, 1903, and July, 1903.
- FOLIN, OTTO. "On Urinary Acidity," *American Journal of Physiology*, July 1903.
- FOLIN. "On Urea and Ammonia Estimation," *Zeitschr. f. Physiol*, xxxii.
- GAUTRELET. (1) "*Urines Sédiments*," &c., 1889; (2) "*Discussion sur les données du coefficient Biologique* (Wallon, Vichy); (3) "*Spectroscopie Critique des Pigments Urinaires Normaux*." Berthier, Paris.
- GOWLAND HOPKINS. "Chemistry of the Urine," *Schafer's Physiology*.
- GARROD and HOPKINS. "On Urobilin and Urinary Pigments," *Journ. of Physiol.*, vol. xxii., 1897.
- HALLIBURTON. "Chemical Physiology." Longmans, Green and Co.
- MERCIER. "*Guide Pratique pour L'analyse des Urines*," 3rd Edition. Baillièrre and Sons, Paris.
- NEUBAUER UND VOGEL. "*Analyse des Harns*."
- ODGEN. "Clinical Examination of the Urine." Saunders, Philadelphia.
- PURDY. "Uranalysis and Urinary Diagnosis," 5th Edition. Davis, Philadelphia.
- SALLERIN. "On Folin's Method of estimating Urea and Ammonia," *Journ. de Physiol. et Pathologie Générale*, March, 1903.
- SHAFFER. "New Method of estimating Ammonia," *American Journ. of Physiology*, 1902.
- SUTTON. "Volumetric Analysis," 1896. Churchill, London.
- TYSON. "Practical Examination of the Urine," 9th Edition. Baillièrre, Tindall and Cox.
- VEILLARD. "*L'urine Humaine*," *Semiologie Urinaire*, Société d'éditions Scientifiques, Paris.

A PLEA FOR THE RECRUIT.

BY LIEUT.-COL. EDWIN FAIRLAND.

Army Medical Staff (Retired Pay).

THE subject of recruiting for the Army is attracting much attention, not only on account of its own intrinsic importance, but also because of certain opinions expressed concerning it by officials of high standing in the Service in connection with the supposed increasing degeneracy of our race. I have no right nor desire to criticise these opinions, but having been engaged in recruiting duties for some years, and having passed some thousands of men into the Service, I may claim to have some knowledge of the subject.

I think the views expressed regarding the physique of applicants for enlistment are unduly pessimistic. In all great cities there must always be a more or less extensive substratum of humanity exhibiting signs of decadence; poverty, hereditary diseases, early marriages, &c., are all factors tending to degeneracy of type, and no city in the world is free from them. I doubt very much indeed whether England has a larger proportion of these decadents than any other nation.

The points for consideration in any discussion on the subject are: (a) Whether this decadence is increasing, and (b) if so, how far is recruiting affected by it? For obvious reasons it must be difficult indeed to find conclusive statistical evidence to strengthen any belief in the first point. Modern sanitary science does so much to protect life, that it may be accepted as a fact that many individuals are preserved to drag out an impaired existence who in earlier times would have disappeared; it is open to question whether any material advantage is gained to the world at large by such preservation; the point is, however, beyond the scope of this paper.

As regards the second question. Generally speaking, the men who present themselves for enlistment are naturally those who have more or less failed in the struggle for existence; their failure has, as a matter of course, impaired for a time their physical condition; but they are by no means "decadents," if by that term is meant men who are victims to permanent physical deterioration.

On the contrary, these men, with few exceptions, soon regain, under Service conditions, all their lost vigour, and become stout and strong young men. At my dépôt the measurements of men enlisted for the Militia are compared, when they return for enlistment into the Regulars, with their second measurements; and it is remarkable the gain there has been under each heading.

Old officers, accustomed to see in the ranks big and burly men, are apt to criticise the "weeds" supposed to fill up so largely the home battalions. They make no allowance for the fact that under the strain experienced in late years the standards have been reduced, and that men smaller in every way are accepted for enlistment. There is full justification for these reductions; it is now recognised that smaller men are at least as efficient for modern warfare as the bigger men of olden days; and my own experience is that the most workmanlike and stable recruits are those who comply with the measurements of the modern linesman—5 ft. 3 in. to 5 ft. 6 in. in height; 33-35 inches chest measurement, and an average weight at 18 years of age of 120 lb. These youths, though small, are tough and sturdy, and by no means degenerate specimens of their race. Again, it would be difficult to find in any Army in the world men of finer physique than the gunners of the Royal Garrison Artillery, whose duties require men of considerable bulk. I have the privilege of passing youths of both these types into the Service daily.

It must never be forgotten that recruits are enlisted at a minimum age of 18 years, for only *three* years' Colour Service. What kind of physique may be expected in men who leave the Army at or about 21 years of age? They have had no time to develop into very strong men, barely sufficient to mature at all. Is any attention paid to the fact, when the physique of the men is thus criticised, that the Army has no attractions as a career for men who look to the future, and possess ambition to succeed in life? Englishmen, as a race, are not deficient in courage, and are ready enough to fight when the need arises—witness the rush for enlistment in 1900. But they do not care for military service which takes them at an age the most useful for starting in some civil career, and leads to nothing in the way of wage-earning. It is true that of late, under strong pressure, the War Office has made some provision for the men on leaving the Colours so that occupation may be found for them; but these efforts are insuffi-

cient. I believe most strongly that all the improvements lately made in the terms of enlistment and service, and all the inducements thrown out to men to enlist, are insignificant and valueless in comparison with a system introduced under official sanction, whereby every man who enlists will know that on completion of his Colour Service he will be eligible, if of good character, for some post under Government ; or in large firms who will, by agreement with the War Office, select their employ es from the men who have served in the ranks. Were such a system organised the natural objections of men of the better class to military service would disappear, for they would know that their time was not being spent uselessly ; and until it is so organised I fear that we can expect only the unemployed class to fill our ranks.

A great deal too much is made of the large proportion of men rejected as medically unfit for enlistment—men so rejected are not necessarily “decadents.” In the first place, the tests applied are severe, and they vary to some extent owing to the idiosyncrasies of the examining medical officers. The men accepted must be almost perfect physically to meet the standards of requirement ; any defect, however slight, is often sufficient to ensure rejection. Take the defects in vision ; what percentage of men in civil life would pass successfully the test required for the Army ? Errors of refraction are not usually signs of disease, but as spectacles are not allowed in the service, the men possessing these errors must be rejected. Take flat feet ; it is a fact that, amongst the class furnishing most recruits, flat feet are the rule and not the exception. The absence of a plantar arch, to a greater or lesser degree, [is almost universal ; and it only becomes a defect when existing to an extreme extent ; but it is a very fruitful source of rejections on the part of many medical officers. Again, the loss or decay of teeth ; of late a high percentage of rejections has arisen from the existence of this defect, and in many cases, in my opinion, most extreme views have been thoughtlessly adopted. A complete set of perfectly sound teeth is extremely rare amongst any class, the Army regulations on this point of defective teeth are sound and common-sensible ; but medical officers are apt to take extreme views on the point, and I have known many most excellent recruits lost to the Service by extravagancies under this head.

Those who criticise rejection statistics must remember that the men actually enlisted are almost entirely free from any

blemish ; it is not merely a "survival of the fittest," it is not that the examining officers pass the best of a more or less indifferent batch of would-be recruits ; it is more than that, it is the rejection of all who fail to reach the prescribed standards. If the recruits are unsatisfactory it is because either the standards are insufficient, or the discriminatory powers of the examining officers are at fault. This being so, and taking the ordinary run of young English lads as they stand, it is rather remarkable we get any recruits at all. Some medical officers reject nearly 50 per cent. of the men who appear before them.

Much has been made of the statement that "three out of five men who wish to join the Army prove physically unfit for military service." If the calculation be correct the explanation is to be found in what is above stated, but the expression, "prove physically unfit," is not strictly correct. The *proof* is non-existent ; the men have not had the chance of *proving* anything either way, they have been rejected at sight simply because they failed to reach the needful standards.

Many men (or rather youths of 18) who have passed through one or more Militia trainings come up for enlistment into the Regulars in an impoverished condition, and therefore under weight. Asked why they are so thin ? They reply, "Out of work since last training." During the time they have been at the depôt their situations (if they had any) have been filled up ; they cannot come back except as casuals, living from hand to mouth. Finally they seek enlistment into the Regulars, not because they are anxious to be soldiers, but because in the Army they can at least be sure of a meal. The material thus offered is not necessarily very bad, but it is hardly the kind from which an ideal Army is made up. It often improves very much indeed, but, then, alas ! the three years' service soon expires ; out into the world again the men must go, to join the great army of the unemployed, having spent three of the best years of their lives—improved, it is true, by good food and discipline, but not provided with anything in the way of capital for investment in the life that is now before them. It may be said that they need not go, that they can extend their service, and eventually re-engage for twenty-one years, thus making soldiering their career. But the War Office does not desire this, it prefers the formation of an Army Reserve, and so it comes

about that hundreds of men are yearly discharged from the Service, with no aptitude for any special work and unfit to compete in the open market with the men who have remained behind. Can it be wondered at that so many soldiers become such derelicts ?

The War Office exhausts itself in its efforts to make the Army popular, so that a better class of men may be induced to join the ranks ; but all these efforts will be in vain unless and until it is understood that the Army itself is the stepping stone to a career. There are no insuperable obstacles to such an ideal. It is not necessary that the pay of the men should be raised, that is sufficient ; but what *is* needed is that the men should know for a fact that on the expiration of their Colour Service they will be cared for ; provided, of course, that their characters are good. The English public is averse to conscription, that must always remain a last resource ; but it is clear that if the voluntary system is to be retained some sacrifices must be made.

The scheme outlined herein embraces two features ; one is the provision to be made at the end of a soldier's service for his well-being in civil life, the other is a provision for his continuance in the service from the day he first enlists. This is secured as follows :—The Militia should be the main entrance into the Army for all men, excepting those for the Cavalry, Royal Horse Artillery and Household Brigade ; and their service in it should be continuous for at least a year ; in fact, the real standing Army at home should consist almost entirely of this force. The men after enlistment should remain at the depôts until they are old enough for transfer to the Regular Battalions on foreign service, which would thus be fed by young men who have had one or two years' service. They would be physically in much better condition and more suited for regular service than the men who now join direct, having already graduated in the ranks of the Militia. Of course, if the men desire it, they should still have the privilege of serving in the Militia only ; but then they would lose the advantages suggested in the first part of the scheme, viz., that of participating in the provision to be made for those who have completed a reasonable length of Colour Service. The Militia should be the basis upon which the Infantry of the Regular Army is founded, the raw material from which the more highly finished Regular soldier is made. But it cannot be too strongly insisted upon

that the success of the scheme must depend upon the guarantees that are given that employment will be found hereafter for the good soldiers who have served their country well. The Army is full of men who deserve a better fate than to fall into the sad condition of units in "the submerged tenth," from whence it is most difficult to rise again. It is true that the Army contains many wastrels for whom little or nothing can be done; the tendency of the scheme outlined here is to lessen this class, to have the ranks filled only by steady respectable young men, willing to spend the earlier years of their manhood in the Army, if at the end they can find suitable employment and means whereby they may make a home and settle down as good citizens. Such men will not join the Service now for the reasons already shown, and the inducements offered in the shape of cubicles, modifications in fatigues, nights out of barracks, &c., are insufficient in view of the ever-present fact that *soldiering leads to nothing*. It is no career from which permanent advantages may be gained.

Editorial.

VACCINE LYMPH.

THE summary report of the year's work at the Army Vaccine Institute, Aldershot, which we publish on another page, cannot fail to be of interest to all who adopt the great Jennerian prophylactic. To ourselves, called upon to practise vaccination in all climates, there naturally suggest themselves a variety of important considerations, notably, methods of preparation, selection and standardisation of samples, keeping qualities and, lastly but not least, the question as to what is the causative agent in vaccinia.

From Major Butler's report it is clear that every precaution is taken at the Army Vaccine Institute to secure as pure a lymph as is possible, combined with the adoption of approved methods for the inhibition and removal of saprophytic bacteria. The employment of glycerine for this latter object is a well-recognised technique, used not only in this country but elsewhere. At the *Conversazione* of the Royal Society, held on May 15 last, we noted an interesting exhibit of a series of cultures from vaccine lymph shown by Dr. Alan Green, of the Local Government Board Laboratory. Half the series had been treated with glycerine and the other half with chloroform. The differences were very marked. Those treated with glycerine gave colonies of extraneous organisms up to three and four weeks, while none were obtained in the chloroform preparations after a period of six hours. Green finds that, by the use of a solution of chloroform in distilled water, extraneous organisms can be eliminated from vaccine lymph in from one to six hours, whilst the specific element remains quite potent for vaccination. His method is as follows: sterile air is passed through pure liquid chloroform in order to become saturated with chloroform vapour. This mixture of air and chloroform is then passed through the vaccine lymph, which has been prepared by rubbing up one part of vaccine pulp with three parts of sterile distilled water. Passage of the mixed vapour rapidly saturates the vaccine emulsion with chloroform, any excess of chloroform escaping automatically. The greatest care is taken to prevent any liquid chloroform passing over into the vaccine, as its presence materially affects the vaccinal

potency. As the limit of solubility of chloroform in water is 1 in 200, it follows that the lymph is never brought in contact with a stronger solution of chloroform than that strength. The germicidal action of chloroform vapour in removing extraneous organisms from the lymph is very great, and the maximum period of contact is practically six hours. After elimination of extraneous bacteria the chloroform in the emulsion is evaporated by passing through it a stream of sterile air. If further experiments confirm these results, and the efficacy of the lymph so treated is not altered, we anticipate that chloroform lymph will soon replace the glycerine lymph with which we are now so familiar. In the face of certain complaints which occasionally arise regarding the quality and sterility of glycerinated lymph, this will be a most desirable result. Apart from these considerations, we consider this method will be of incalculable value when there are urgent demands for a rapid supply of vaccine lymph, such as may arise during small-pox epidemics.

When we come to inquire into the prevailing practice of different laboratories as to standard required of a lymph before issue, we find some diversity of views, but from a recent study of this question we are disposed to formulate the following essentials for glycerinated calf lymph: (1) Emulsions should not be issued earlier than forty-two days after glycerination; (2) the physical condition should show a uniform emulsion; (3) cultures made must show a relatively small number of saprophytic bacteria, and be absolutely free from pyogenic organisms; (4) the injection of the mixed contents of twelve tubes into a guinea-pig must be negative; (5) the clinical test must give not less than 90 per cent. of typical successful results in primary vaccinations.

To those familiar with the preparation of glycerinated vaccine lymph it is well known that after the tubes have remained quiet for a few weeks a separation of the more solid particles takes place from the glycerine. As now found in the market, vaccine consists essentially of ground-up epithelium and leucocytes in a variable percentage of glycerine and water. If this mixture is not carefully adjusted it may be too thin, followed by a relatively rapid separation. Certain experiments which we have made indicate that tubes in which such separation is apparent will give a higher percentage of failures, when clinically tested, than lymph recently tubed and in a state of true emulsion. The explanation probably is

that the thin glycerine is easily blown out of the tube by the operator and with it a sufficient amount of the virus is not carried out.

It must be recognised that there is practically no vaccine on the market free from bacterial contamination, although some samples are remarkably pure; and, so far as bacterial impurities are concerned, there is practically no difference between the glycerinated virus dried on ivory points and that hermetically sealed in capillary tubes or between glass plates. The bacterial fauna and flora of vaccine lymphs are somewhat diverse. As the qualitative determination is the essential object of any inquiries under this head, tube slopes and plate cultures on agar or gelatine are the most valuable procedures to adopt. The chief bacteria found in glycerinated calf lymphs are *Staphylococcus pyogenes albus* and *aureus*, iridescent cocci, proteus-like organisms, yeasts, moulds, *Bacillus subtilis*, *Bacillus mesentericus vulgatus*, and various beaded and indeterminate rods. As the saprophytic bacteria do not develop as rapidly as the pus cocci, the culture needs to be kept under observation for several days. The absence of these indicates clean preparation. Animal experiments are best made on guinea-pigs, by subcutaneous injection, and should not be made until the cultures show a marked reduction in the number of pus bacteria. From the animal experiments the presence of *Bacillus tetani* and *Bacillus tuberculosis*, or other specific pathogenic forms, can be determined. These bacteria are found with extreme rarity in vaccine, and so far as our experiences go may be said to never occur.

In respect of limits of resistance of the specific element of vaccine, or the keeping qualities of a lymph, we have made certain observations which have an important bearing upon the supply of this material at our foreign garrisons and its routine storage in cantonments and other places in our tropical stations. Without entering into details, it may be accepted that the lethal point of the specific virus of vaccine is 59° C. (138° F.), and that a very brief exposure to a temperature of 60° C. is sufficient to cause loss of potency. This question has been under consideration by the officials of the Local Government Board, and their conclusions are similar to those just enunciated. We need not say that in these facts we have the clue to the inefficiency of much lymph to be found stored under unsuitable conditions in India and elsewhere.

Mention has been made of the causal element of vaccinia; recent work, particularly that by Wasielewski (*Zeitschrift f. Hygiene*,

xxx. 8), suggests that it has really been identified. He started a series of inoculations, with glycerinated lymph derived from the Halle Vaccine Laboratory, from rabbit cornea to rabbit cornea. The lesion made was so small as to be hardly visible to the closest inspection; about the third day the vaccinal changes were found to be at their height, consisting of a slight thickening of the corneal epithelium. This he found to consist of swollen and vacuolated epithelial cells, containing the peculiar bodies associated with the name of Guarnieri. These bodies have been examined, and their presence confirmed, by Monti, E. Pfeiffer, Hückel, Salmon and Gorini, who describe them as highly refractile, spherical granules or masses of granules lying close to the cell nucleus, but not to be found in the cells of the normal cornea, nor occurring in the corneal cells after any form of irritation or inflammation, other than vaccinal. Active vaccine or variola lymph alone is capable, so far as is known, of producing them, consequently they may be regarded as specific.

From the fifteenth and also from the twenty-fifth generation on the rabbit cornea, von Wasielowski, with every precaution against contamination with ordinary vaccinia, inoculated calves, and obtained typical vesiculation and production of active lymph. Similarly, with lymph derived from the forty-third generation on the rabbit cornea, inoculations were made on children, and gave an insertion vesicular success of 33 per cent. The whole circumstance of this series of experiments is so scientific that it is difficult to doubt that the causal element of vaccinia, whatever it is, propagates itself in the inoculated cornea. It is true bacteria are absent, but the organism of vaccinia cannot be of their minuteness, as it is stopped to a large extent by a threefold filter paper. The presence of the bodies described is the only abnormality constantly found in the specifically affected corneal cells, and the only inference to be drawn from this experimental evidence is that vaccinia (possibly variola, too) is the result of an intracellular parasitism, the visible expression of which is the appearance of the bodies described by Guarnieri and von Wasielowski. We have still to find out the true nature of these bodies, and whether they are the actual parasites or merely protoplasmic changes induced by parasites.

NATIONAL PHYSIQUE AND MILITARY SERVICE.

WE observe the revival of public interest in this subject, to which attention was originally drawn by Sir F. Maurice in his paper on "National Health: a Soldier's Study," published in the *Contemporary Review* of last January. The recent issue of a memorandum from the Director-General of the Army Medical Service specially calls attention to the subject as it affects the British military forces. No matter from what point of view we regard it, the problem presents many difficulties, not the least being that of knowing the actual facts of the case. The basis of the present controversy is General Maurice's statement that only two out of five men enlisting remain in the Army as effective soldiers at the end of two years' service, or, in other words, that 60 per cent. of the men offering themselves for enlistment are physically unfit to complete their colour service. At first sight this naturally appears to be a grave condition of affairs, but it is legitimate to ask whether the facts are quite as bad as they look, and whether the inferences drawn are altogether justified.

From the Director-General's tabular statement it is demonstrated that between 1893 and 1902 no less than 679,703 men were medically examined for enlistment, and of these 234,914 were rejected as medically unfit for service, giving a rejection ratio of 34·6 per cent. ; of the men passed fit, 5,849 broke down within three months after enlistment, or 0·9 per cent. ; while 14,259, or 2·1 per cent., were discharged as invalids under two years' service. To these ineffectives we may add a certain number who were so manifestly unfit for service that they were turned away without medical examination ; of their number no record is kept, but we demur to any assumption that these swell the total of rejections to as much as 60 per cent., or three out of five. The figures available suggest that, of those actually and originally examined, only 38 per cent. were rejected at one time or another before the lapse of two years, and presumably the remaining 62 per cent. must be still serving with the Colours after that period. An analysis of the chief causes of rejection by examining officers are, under chest measurement, under height, under weight, defective vision, and loss of or decayed teeth. In a sense, all these causes of rejection may be regarded as indications of poor physical development, and the result of causes or conditions of life antago-

nistic to health ; but before we assume to infer from these facts that either the race as a whole, or a section of the population in particular, is becoming physically degenerate, we must bear in mind that the standard to which these would-be soldiers are asked to conform is severe. Whether physical degeneracy is really increasing in the classes from whom we draw our recruits is difficult to determine with accuracy, owing to the absence of reliable data concerning the physical standard of the same class fifty or a hundred years ago. Of the general population, the evidence points to an improving rather than a deteriorating physique.

An interesting sidelight on this question is supplied by recent investigations made by Mr. B. Waugh, of the Society for the Prevention of Cruelty to Children, with a view to the codification of the standards of weights and measurements of children, in order to ascertain how far the children of London are underfed. The results go to show that the children examined were, on the whole, in a satisfactory condition as regards nourishment and health. If the rising generation, as typified in an average working-class district of London, are being well nurtured and brought up under improved health conditions, there would appear to be little ground for alarm.

A study of the annual tables concerning recruits given in the Reports of the Army Medical Department shows no marked changes in recent years, either in respect of the social strata from whom we draw recruits, of the proportion which various occupations or groups bear to the whole number examined, or the ratio rejected in each of such groups. The figures consistently indicate that the bulk of the men are drawn from the unskilled labour class, and that the highest ratio of rejections is among men who have been following indoor or essentially urban occupations.

It is not difficult to find an explanation of this. Competent observers estimate that 77 per cent. of the population live in towns, and that about a quarter of this town population are not only poor, but are living in such actual poverty as to be unable to rear their children under conditions favourable to health and physical fitness. There is only too much reason to believe that the bulk of the men seeking enlistment belong to this section of the population. The causes of this lamentable condition are undoubtedly complex. To the steady flow of the rural population into towns, and the consequent overcrowding of these urban centres, is due

much of the physical degeneracy which certainly exists. Had it not been for the persistent teaching of sanitation during the last generation, the state of our larger towns might possibly have been worse. But may not the beneficial working of hygienic enactments in reducing directly the bills of mortality have contributed indirectly to the bringing about of the facts which we now deplore, namely, the existence of a race of physical degenerates? Under conditions prevailing in what may be termed the pre-sanitary period, the living would represent largely the survival of the fittest. Under the fostering influence of Hygeia many survive who, under ruder conditions, would have died. These survivals are sexually mature; weak men marry girls as weak as themselves, and beget sickly children who grow up more weak than their parents. Add to this the effects of ignorance on the part of mothers, scarcity and impurity of milk, overcrowding and the ever-present strain of the struggle for existence, and we get a sequence of facts which must tend towards physical deterioration.

Interesting as these facts must be to every thoughtful citizen, the analysis of racial economics is hardly within our province as soldiers. The matter which concerns us is, how can we obtain a steady flow of good material to maintain the Army at a standard, numerically and physically, sufficient to meet the calls of the State. We doubt whether information is wanted as to the causes of physical deficiency among our recruits; surely these causes are patent enough. What we need is information as to the best means of attracting to the Colours those whom we fail to have any chance of accepting. There are plenty of them who are far from being physically degenerate. An inquiry dealing with this aspect of the question might well be undertaken. For our own part, we think the only remedy lies in widening our basis of supply, either on the lines suggested by Lieut.-Col. Fairland, or compulsory service for all classes, at least for home defence. The acceptance of this principle would obviate many pressing military difficulties, and, by tapping social strata at present practically untouched, would minimise the complaint which dominates Sir F. Maurice's paper on "National Health: a Soldier's Study." We are disposed to think that there is no need for pessimism as to national physique; what we need is a broader conception on the part of the nation of each man's duty to the State.

MEMORANDUM ON THE PHYSIQUE OF RECRUITS BY THE
DIRECTOR-GENERAL, ARMY MEDICAL SERVICE.*

A DEEP interest has been aroused, both in the lay and medical press, by the writings of Sir Frederick Maurice and others, who have brought into prominence certain observations pointing to the fact that there is an alarming proportion of the young men of this country, more especially among the urban population, who are unfit for military service on account of defective physique.

The questions naturally arise as to whether this impeachment of the national health has a solid foundation in fact, and as to whether the condition is true of the population as a whole, or only of a certain section of it. The teaching of public health statistics would appear to show that progressive improvement of the national health has steadily followed the improved conditions of life which have been brought about by the advance of sanitary knowledge and its practical application. It has also been pointed out that athletic records are constantly being broken for all sorts of feats of strength, agility, and endurance, facts which would seem to indicate that the physique of the well-to-do classes, at least, is improving rather than deteriorating. It is nevertheless true, and the fact is a disturbing and disquieting one, that a very large proportion of the men who offer themselves for enlistment in the Army are found to be physically unfit for military service.

In an article on the National Health, which appeared in a recent number of the *Contemporary Review*, Sir Frederick Maurice states that, according to the best estimate he had been able to arrive at, it has been for many years the case that out of every five men who wished to enlist, and primarily offer themselves for enlistment, you will find that by the end of two years' service there are only two men remaining in the Army as effective soldiers. Of the men who offer themselves, some are rejected by the recruiting serjeant or recruiting officer; some by the examining medical officer; and some, though enlisted, are found after three months to be unlikely to develop into effective soldiers and are summarily discharged. According to General Maurice's experience, at the end of two years not more than 40 per cent. of the men who wished to become soldiers will be found serving; or, in other words, 60 per cent. of the men offering themselves are physically unfit to serve as soldiers. He points out that it is no good talking of conscription, or of any form of compulsory service, if we already have five men offering themselves for every two men who are fit for the work; no one has suggested that we should increase our Army in the proportion of two to five,

* Addressed to the Secretary of State for War, and issued as a Parliamentary Paper, July 16, 1903

i.e., make it two and a half times at large as it is now. He then goes on to say that no nation was ever yet for any long time great and free, when the army it put into the field no longer represented its own virility and manhood.

But the want of physique thus shown to exist with regard to a large section of the community is not only serious from its military aspect, it is serious also from its civil standpoint, for if these men are unfit for military service, what are they good for? As Lauder-Brunton says: "Poor in physique as they all are, and poor in mental capacity and power of application as many of them must be, what becomes of them? Many of them probably marry girls as weak as themselves, and have children, some of whom go to swell the lists of infant mortality, some to join the criminal classes, while others grow up more weak and incompetent than their parents." Enquiry is wanted, and it is vital for us to know the truth. Whether part of the physical deterioration is the result of unskilled labour flocking to the towns and there failing to find means for properly rearing a family, or whether it be on account of causes which are attackable, such as early marriages and the ignorance of mothers, the result is that the rising generation of all below the artizan class includes a vast number of men of a very low standard of health and physique.

Regarding the condition of the poorer classes, Mr. B. S. Rowntree read a paper at the British Medical Association Meeting, last August, on "Poverty and Disease" (*British Medical Journal*, August 16, 1902). His observations refer to York, which has a population of about 75,000. In discussing the question he speaks of poverty under two heads, primary and secondary poverty. He defines "primary poverty" as the condition when the total earnings are insufficient to obtain the minimum necessities for the maintenance of physical efficiency in the family. "Secondary poverty" is when the earnings would be sufficient if some part of them were not wasted. He found that in York 10 per cent. of the total population were living in "primary poverty," and that of this 10 per cent. just one-half (52 per cent.) is due to the fact that the chief wage-earner, though in regular employment, has wages which are insufficient to maintain a family of moderate size in a state of physical efficiency. Eighteen per cent. of the population were living in a state of "secondary poverty," so that, adding the two classes together, 28 per cent. of the population in York are living in poverty. Some years ago Mr. Charles Booth estimated that in London 30 per cent. of the people were living in poverty. If, then, the same conditions prevail in other large towns, it would appear that more than a quarter of our town populations are living at, or below, the poverty line. Now in England and Wales, at last year's census, 77 per cent. of the population was urban, namely, 25 millions out of 32½ millions; the town population having increased 15 per cent. during the last decade.

Every year a table is published in the Army Medical Department Report which classifies the recruits examined according to their previous occupations. The following is the table for 1900. It has not been selected for any special reason, but is given as an average example of our recruiting experience :—

Occupation of recruits	Number inspected	Number rejected	Ratio rejected per 1,000 inspected	Proportion of each group in 1,000 recruits inspected
1. Labourers, servants, husbandmen, &c.	52,022	15,025	288·82	616
2. Manufacturing artisans (clothworkers, weavers, lace-makers, &c.)	11,971	3,478	290·54	142
3. Mechanics employed in occupations favourable to physical development (smiths, carpenters, masons, &c.) ..	11,201	2,923	260·96	133
4. Shopmen and clerks	5,950	1,826	306·89	70
5. Professional occupations, students, &c.	827	220	266·02	10
6. Boys under 17 years of age	2,431	273	112·30	29
Total	84,402	23,745	281·33	1,000

Examination of a series of these annual tables shows that the proportion of the different classes remains remarkably constant from year to year, and the figures indicate that the bulk of our soldiers are drawn from the unskilled labour classes, and consequently from the stratum of the population living in actual poverty or close to the poverty line. As might be expected, the highest ratio of rejection is shown for men who have been following indoor occupations.

The impairment of vigour and physique among the urban poor is easy to understand when we reflect that, in addition to their only being able to provide themselves with food insufficient in quantity and probably poor in quality, their poverty also usually entails unhealthy environment, *e.g.*, defective housing, overcrowding, and insanitary surroundings. Add to this the distress resulting from such causes as want of thrift, illness or death of the bread-winner, and alcoholic excess. Further, the physical deterioration caused by inherited or acquired disease must not be forgotten, and in illustration we need only instance the part played in this way by tubercle and syphilis.

In his Annual Report for 1902, just issued, the Inspector-General of Recruiting remarks that the one subject which causes anxiety in the future as regards recruiting is the gradual deterioration of the physique of the working classes from whom the bulk of the recruits must always be drawn, and, when it is remembered that recruiters are instructed not to submit for medical examination candidates for enlistment unless they are reasonably expected to be passed as fit, we cannot but be struck by the percentage considered by the medical officers as unfit for the

Service. In the reports from all the manufacturing districts, stress is invariably laid upon the number of men medically rejected for bad teeth, tender feet, and inferior physique.

Examining next the Army recruiting statistics in relation to the assertion that practically 60 per cent. of the men offering themselves for enlistment are unfit for military service, the following table has been compiled from information given in the Army Medical Department Reports, supplemented in some particulars by data obtained from the reports of the Inspector-General of Recruiting. A period of ten years (1893-1902) has been selected, as, of course, the greater the number of observations dealt with the nearer will be our approximation to the truth.

Year	1. Number of recruits inspected. (A.M.D. Report)	2. Number rejected on inspection. (A.M.D. Report)	3. Number re- jected within 3 months after enlistment. (A.M.D. Report)	4. Invalids discharged during the year under 2 years' ser- vice. (I.-G.R. Report)	5. Ratio per cent., column 2	6. Ratio per cent., column 3	7. Ratio per cent., column 4
1893	64,110	25,999	342	962	40.6	0.5	1.5
1894	61,985	24,705	369	770	39.9	0.6	1.2
1895	55,698	22,548	368	952	40.5	0.7	1.7
1896	54,574	22,698	413	999	41.6	0.8	1.8
1897	59,986	22,370	575	997	37.3	1.0	1.7
1898	66,502	22,988*	387	983	34.6	0.6	1.5
1899	68,087	22,071	433	1,003	32.4	0.6	1.5
1900	84,402	23,105	640	1,514	27.4	0.8	1.8
1901	76,750	21,522*	1,014	3,825	28.0	1.3	4.9
1902	87,609	26,913*	1,308*	2,254	30.7	1.5	2.5
1893-1902 ..	679,703	234,914	5,849	14,259	34.6	0.9	2.1

* Does not include men enlisted in 1902 and discharged under three months' service in 1903.

It will be observed that during this decennial period the number of men medically examined for enlistment was 679,703, and of those 234,914 were rejected as medically unfit for service, giving a rejection ratio of 34.6 per cent.; of the men passed fit, 5,849 broke down within three months after enlistment, being at the rate of .9 per cent. for this class; while 14,259, or 2.1 per cent. more, were discharged as invalids under two years' service. The smallness of the rate of the rejections within three months of enlistment, varying, as will be observed, between .5 and 1.5 per cent., speaks well, I think, for the thoroughness of the primary medical examination of recruits. But the rejection of one out of every three men examined by the recruiting medical officer points clearly to the poorness of the human material available for army purposes, as a writer in the *Lancet* puts it. Adding together the rates for

the three classes of rejections referred to in the table, we find that 37·6 per cent. of the 679,703 men examined during the decennial period proved to be unfit for military service. This percentage of rejections does not, however, represent the whole extent of the physical unfitness existing among men wishing to become soldiers, and offering themselves for enlistment. The Inspector-General of Recruiting states in his report for 1902 that it must be borne in mind, when examining these totals, that they do not represent anything like the total number of the rejections of candidates for enlistment into the Army. A large number of men are rejected by recruiting serjeants and recruiting officers, and such men in consequence are never medically inspected and do not appear in any returns. In the decennial period under consideration we have only been able to account for 37·6 per cent. of rejections from official statistics; but, according to Sir Frederick Maurice's estimate, 60 per cent. of the men who offer themselves are unfit for service. This indicates that the number of men turned away by the recruiters themselves as unlikely to have any reasonable chance of passing the medical examination is an appallingly large one. As already stated, no official record is kept of the number of men turned away; but there is reason to believe that the number is a large one, though whether it is sufficiently large to bring up the figures of the rejected to 60 per cent. we have no means of saying.

Examination of the statistics dealing with the causes of rejection by examining medical officers of men seeking enlistment brings into prominence the fact that the majority are rejected on account of causes indicating poor physical development, namely, under chest measurement, under height, and under weight. Defective vision may also be regarded in many cases as resulting from developmental defect. The following table gives the statistics relating to the principal causes of rejection for the eleven years 1892-1902:—

CAUSES OF REJECTION OF RECRUITS ON INSPECTION, WITH RATIO PER 1,000. 1892-1902.

Cause of rejection	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902
Under chest measurement	95·90	108·55	110·27	126·38	130·64	89·44	73·88	65·84	59·84	49·88	56·72
Defective vision	42·35	41·51	42·90	39·88	40·72	41·15	42·64	41·99	36·42	35·84	39·23
Under weight ..	27·62	39·99	39·61	36·58	35·95	45·58	34·82	33·84	28·52	25·15	21·72
Under height ..	32·71	33·24	28·67	28·72	28·77	24·86	21·79	20·21	15·18	13·56	11·59
Imperfect constitution and debility ..	9·87	9·47	5·00	3·57	4·44	4·45	5·49	5·82	4·94	3·36	3·91
Disease of veins	16·24	17·11	15·84	15·85	15·72	15·42	15·74	14·22	11·69	13·98	12·30
Disease of heart	13·87	17·74	19·62	20·71	18·76	17·67	17·26	15·69	13·15	16·74	17·33
Defects of lower extremities ..	17·09	14·40	17·44	18·16	18·14	18·12	17·72	13·98	10·53	10·35	12·27
Varicose ..	11·85	12·85	14·25	12·28	13·07	13·07	12·29	12·16	11·21	13·89	12·59
Flat feet ..	9·83	12·45	14·71	13·16	17·81	16·79	12·24	12·31	9·02	11·66	12·44
Loss or decay of teeth ..	14·56	15·33	16·26	17·95	19·75	24·16	26·34	25·29	20·02	26·70	49·26

It will be observed that bad teeth and flat feet, causes of rejection to which considerable importance was attached in General Maurice's paper in the *Contemporary Review*, occupy a comparatively low place in the list. But with regard to loss or decay of teeth, it must be pointed out that the numbers rejected on this account during the past four or five years have shown steady increase, until this cause of rejection has come to regularly occupy a high place on the list. Whether the increase in the rejections for bad teeth is an indication of increasing prevalence of physical unfitness is open to question; the increase may partly, at least, be due to the more common use of articles of food which readily undergo acid fermentation, and partly also to examining medical officers having gradually come to place a high value on soundness of teeth as a matter of the greatest importance in its relation to the maintenance of the physical efficiency of the soldier on service. The main inference to be drawn from a consideration of the figures in the table is that the bulk of the rejections arise from causes indicating the operation of agencies antagonistic to healthy physical development.

It has already been stated that a large proportion of the population live in towns, and this has been estimated at 77 per cent., or 25,000,000. Of this town population about 25 per cent. (probably at least 6,000,000) appear, from trustworthy investigations, to be not only poor, but living in actual poverty, so as to be unable to rear their children under conditions favourable to health and physical fitness. The bulk of the men who seek enlistment belong to this section of the population, and a very large proportion (but probably not quite three out of five, as stated by General Maurice) of the men who wish to join the Army prove physically unfit for military service. It is not claimed that the same proportion of poor material will be found generally distributed amongst all classes of the community. In an earlier paper in the *Contemporary Review*, on "Where to Get Men," General Maurice remarks regarding this point: "Of course, as yet, that stern and brutal fact of the two in five does not mean that of the whole male population of the kingdom there are only two out of five who are fit to bear arms."

In the concluding paragraphs of his paper on "National Health: a Soldier's Study," Sir Frederick Maurice states: "My object is to call upon the great profession whose immediate concern is health to give us the guidance and leading we need, and primarily it seems to me that we ought to call upon the Councils of the Colleges of Physicians and Surgeons, as *ex officio* the great national boards of health, to help and guide us." I should suppose that they have not at this moment, despite the census, sufficiently comprehensive data on which to pronounce, but if that be so, no Government could or would wish to resist an appeal from them for assistance in getting at the truth on

the tremendous question which has been raised by the investigations of Mr. Rowntree: "Is it or is it not true that the whole labouring population of the land are at present living under conditions which make it impossible that they should rear the next generation to be sufficiently virile to supply more than two out of five men effective for the purposes of either peace or war."

The question at issue constitutes a problem by no means easy to solve. Were all classes of the community able to provide their offspring with ample food and air space, a healthy race would be produced, and the proper material to fill the ranks of the Army would probably soon be obtained.

Information is wanted as to the causes of physical deficiency and as to the best available methods of remedying defects and improving the national health. Such an enquiry might fitly be undertaken by a commission, as to the composition of which the advice of the Colleges of Physicians and Surgeons might be asked. As the matter is one of the utmost importance from the recruiting point of view, it is suggested that the Secretary of State might take the initiative in the matter of getting the opinion of the Councils of the Colleges with regard to—(a) the necessity for such an enquiry; (b) the ground to be covered by a commission if appointed; (c) composition of commission.

War Office,
April 2, 1903.

W. TAYLOR,
Director-General, Army Medical Service.

Current Literature.

I.—MEDICINE AND SURGERY.

Fatal Case of Idiopathic Œdema.—This remarkable case is reported by R. Staehelin (*Zeitsch. f. Klin. Med.*, Bd. 49, Hft. 5, u. 6, 1903). A laundress, aged 51, noticed in July that the eyelids were swollen. A fortnight later the whole of the face was œdematous and tender. The general health was good. The swelling and redness gradually extended to the chest and arms, and was accompanied by burning sensations. On August 6 deglutition became painful, and shortly afterwards pain was produced by movements of the limbs. She was admitted to hospital on August 20. The skin of the forehead, cheeks, and chin was bright red as though affected with erysipelas. The neck and chest were also reddened, but less intensely, and the skin of the forearms resembled that of the face. The redness disappeared on pressure. There was some desquamation over the face, but no formation of vesicles or nodules. The eyelids were markedly œdematous, the temperature was 98·8° F., the pulse 72. The œdema gradually extended over the whole of the body, and was extremely marked in the hands and feet. Except in the parts first affected—the face, chest and arms—there were no signs of dermatitis, and the skin was white. The œdematous parts were soft and readily pitted on pressure. Later, the mucous membrane of the mouth and pharynx became involved, and there was progressive difficulty in deglutition and speaking. The œdema of the urethral mucosa necessitated constant catheterism. The internal organs were healthy. Only 35 ounces of urine of specific gravity 1020 were passed in the twenty-four hours; it contained no albumen. The retention of water caused a gain in weight of more than 10 kilos. in twenty-three days. Sodium salicylate, iodide of potassium, atropine, thyroïdin, diuretin, pilocarpine, and other sudorifics were equally useless, and death occurred from progressive inanition on October 12, about three months after the onset of the disease. The necropsy confirmed the clinical diagnosis of idiopathic or essential œdema. The skin and mucous membranes were œdematous, but the heart, kidneys, thyroid gland, blood and other organs were normal.

This form of œdema is distinct from the more common acute circumscribed variety. A number of cases have been reported, some acute, others chronic. Of the former all ended in recovery after a few days. Of the latter several proved fatal. Occasionally there was effusion into the serous cavities.

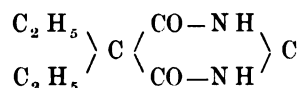
Paroxysmal Hæmatoporphyrinuria.—The paroxysmal occurrence of hæmatoporphyrinuria has not been previously noted. Pal (*Zentralbl. f. inn. Med.*, June 20, 1903) was consulted by a man, aged 66, for attacks of abdominal pain of six years' duration. On exposure to cold or damp he experienced a slight spasm or discomfort behind the lower part of the sternum, which was soon followed by pain in the right lumbar region. These

sensations invariably preceded the passage of almost black urine. After twelve or twenty-four hours the urine resumed its normal appearance. The attacks occurred only in winter. For eight months he had also suffered from violent attacks of pain in the gastric region, which radiated to the right shoulder. They were of short duration and were never followed by the passage of black urine. The arteries were somewhat rigid, the blood pressure was high, and the heart was enlarged. There was a faint systolic murmur over the aortic area, and the second sound was accentuated. He had had malaria and syphilis about forty years previously.

The writer assumed that the blackness of the urine was due to hæmoglobinuria; but on examination of a specimen of urine passed on April 17 after two hours' exposure to cold it was found that the colour was due to a quantity of hæmatoporphyrin and not to hæmoglobin. The urine was acid, of specific gravity 1028, and contained 2.73 per mille of albumen. The sediment consisted of crystals of uric acid, pavement and renal epithelium, lymphocytes, and hyaline and granular casts with granules of pigment. The next day the specific gravity was 1016 and the hæmatoporphyrin had disappeared. There was a trace of albumen and a copious sediment, which contained neither blood cells nor hæmoglobin.

Hæmatoporphyrin occurs normally in the urine in minute traces, and in pathological quantities under various conditions, such as sulphonal poisoning, lead colic, intestinal hæmorrhage, and hepatic diseases. Recurrent attacks of hæmatoporphyrinuria have been observed in a case of Graves' disease by McMunn. The same authority has reported a case in which traces of hæmatoporphyrin were present in the urine in the intervals between attacks of hæmoglobinuria. But it has not before been recognised that hæmatoporphyrinuria may depend on the same causes as and present symptoms identical with those of paroxysmal hæmoglobinuria.

"Veronal": a new Hypnotic.—A report on thirty cases in which this preparation was employed is presented by Wiener (*Wien. Med. Presse*, June 14, 1903). Chemically it is diethylmalonyl-urea, its formula being:—



It was administered in the form of tablets in doses of $3\frac{1}{4}$ to 15 grs., and was usually followed by refreshing and quiet sleep within half an hour. To exclude suggestion patients were told that the tablets were aperient or were to relieve cough. Repeated doses were well borne; in one case as many as thirty-two $7\frac{1}{2}$ -gr. tablets were given within forty-three days. But frequently a single tablet procured sleep for four or more nights, and the insomnia usually disappeared after at most ten tablets had been taken. Veronal is useless in painful affections such as acute rheumatism. The most satisfactory results were obtained in the insomnia of hysteria, neurasthenia, advanced phthisis, chronic uræmia, and uncompensated heart disease. There are seldom any after-effects, but slight headache and giddiness may be present on waking. The blood pressure appears to be uninfluenced or slightly lowered.

“Tenodesis” : a new form of Arthrodesis.—This method of correcting paralytic deformities is described by Max Reiner, of Lorenz's Clinic in Vienna (*Wien. Med. Woch.*, June 27, 1903). The indications for arthrodesis have been greatly restricted since the introduction of tendon grafting, but in cases of extreme paralysis, transplantation of tendons may be insufficient, and in complete paralysis it is useless. Arthrodesis, or the production of artificial ankylosis at the most favourable angle, is then useful, especially in the different varieties of talipes. But though walking may be rendered possible, the destruction of all power of movement in the joint is a serious disadvantage. In tenodesis the tendons of the paralysed muscles are fastened to the bone so as to destroy completely all remaining functional activity. The fixation is so arranged that part of the tendon on the peripheral side of the sutures is put on the stretch, and acts as a ligament. Thus in paralytic talipes equino-varus the foot is first manipulated into a good position. The tendons of the peronei are firmly fixed to the posterior surface of the fibula. The peripheral ends are put on the stretch, and oppose return into the varus condition. In the case of the peroneus brevis a new ligament is formed between the base of the fifth metatarsal bone and the fibula. This keeps the foot permanently pronated and prevents the return into the supinated position; all other movements of the joint—flexion and extension—are retained. The equinus position is corrected by tenodesis of the extensors. The advantages of the method over simple shortening of the tendons consists in the fact that the most atrophied and weak part of the muscle, *i.e.*, the muscular substance, is eliminated. The one disadvantage is that the atrophied tendon may stretch when converted into a ligament. In adults the difficulty may be overcome by employing silk instead of the tendon or by strengthening the latter by interweaving strands of silk. In children “artificial tendons” are inadmissible, because they are incapable of growth as the foot enlarges, and there is danger of over-correction resulting. It is best in children to strengthen the greater part of the proximal end of the tendon with interwoven silk cords, and to leave a small portion at the insertion free to elongate.

The writer has repeatedly employed the method for talipes. The incision begins over the external surface of the lower end of the fibula, and curves forward round the external malleolus. A fairly large canal is bored in the fibula from before backwards and the periosteum is divided and retracted from the outer surface between the anterior and posterior apertures. The silk thread from the peroneal tendons is passed through the canal from behind forwards, and that from the extensor tendons from before backwards, and the two are knotted round the outer surface of the fibula and covered with periosteum. Any desired tension may be obtained by this means.

Conservative Treatment of Severed Fingers and Toes.—A. Besson (*Jour. des Sciences Med. de Lille*, June 13) calls attention to the fact that fingers and toes almost severed, which are often removed, may be saved. He relates the following cases: Case 1, a boy, aged 17, had the second and third phalanges of the little finger detached by a cut of a knife through the proximal interphalangeal joint. The phalanges hung only by a narrow band of skin. He did not seek advice for two days yet the severed phalanges

preserved some sensibility. The parts were carefully washed, a single suture was introduced, and a wet dressing and a palmar splint were applied. The dressing was changed daily and healing by first intention appeared probable. But the patient neglected to attend hospital for four days, and by undoing the dressing set up suppuration. However, complete union took place in six weeks. Case 2.—A boy, aged 17, sustained dislocation of the proximal interphalangeal joint of the index finger. On the dorsal and external aspects the skin was torn and the extensor tendons and external and internal lateral ligaments were divided. On the palmar and internal lateral aspects a few scraps of integument and the flexor tendon remained. The articular surface of the first phalanx projected $\frac{1}{2}$ cm. above that of the second. After washing, an antiseptic wet dressing and a splint were applied. The dressing was renewed daily and union took place. Case 3.—An elderly man was injured by a large box falling on his foot. A large gash began on the plantar aspect of the great toe and passed round the internal and dorsal aspects of the metatarso-phalangeal joints and ended a little above its origin. All the tendons and ligaments were torn; only a thin band of skin attached the toe to the foot. The joint was open, the articular surfaces were crushed, and the fragments of bone were broken off. After washing, a single suture was placed on the dorsal aspect and a wet antiseptic dressing and palmar splint were applied. Union took place. Case 4.—A man, aged 31, had the second finger of the left hand almost torn off a little above the last joint; only the soft parts on the internal aspect remained. The parts were washed, a suture was introduced on the dorsal and on the palmar aspect, and a dressing with lateral splints applied. Union took place by first intention.

Plastic Operation for Restoration of the Face.—N. Senn (*New York Med. Jour.*, June 20) describes a new plastic operation performed by him. A man, aged 35, came under observation in June, 1901. At the end of 1900 he was treated by a quack for a swelling of the upper lip pronounced to be cancer. For ten weeks a caustic paste was applied. Great pain was produced and the nose, upper lip, cheeks, and lower eyelids sloughed away. Healing slowly took place. The conjunctiva of the lower lids was everted and attached to the bone below. The superior maxillæ were covered with a thin adherent scab. Cicatricial contraction caused eversion of the lower lip. The cavities of the mouth and nose were exposed. An attempt was made to restore the upper lip by taking flaps from the neck and lining their inner surface with flaps taken from over the angles of the jaw. But the flaps sloughed leaving the face worse than before. It was then decided to take a huge flap from the scalp from ear to ear. To prevent sloughing the flap was detached in different stages, and to prevent undue contraction the central two-thirds of its under-surface which would ultimately become part of the mouth were lined with skin by means of Thiersch's grafts before the flap was detached from its bed. The scalp was first shaved and disinfected. The following were the stages of the operation: November 7, 1901.—The base of the flap on the left side was made by making two incisions running upwards and forwards from the ear in the parietal region. The flap was detached from the temporal and

occipital fascia and reunion was prevented by interposing strips of gutta-percha tissue. November 12.—The operation was repeated on the right side. November 26.—The anterior incisions were united by an incision across the frontal eminences extending down to the occipito-frontalis fascia from which the entire flap was lifted away. The part of the margin which was to form the lip was lined with a thin narrow strip of skin from the forehead which was sutured to the under surface of the flap with catgut. The rest of the under surface was covered with large Thiersch's grafts taken from the thigh. The grafts were protected with strips of gutta-percha tissue. The whole head was covered with a large gauze compress soaked in normal saline solution and heat and moisture were maintained by a covering of gutta-percha. The grafts united by first intention. December 3.—The posterior incisions were extended to within two inches of each other. December 12.—The whole of the flap, consisting of nearly half of the scalp, was detached completely but left in place, adhesion being prevented by interposing gutta-percha tissue. December 21.—The flap was lifted from its bed and lowered over the face and the large granulating surface on the scalp was covered with Thiersch's grafts. Both flaps and grafts were covered with a salt-water compress. January 2, 1902.—The flap was sutured in position and the superior maxillæ were vivified by dissecting off the scar tissue with forceps, knife, scissors and sharp spoon. Union took place throughout except at a point below the nares which was closed later after the nasal cavity had been opened by an incision through the flap. April 10.—The left lower eyelid was restored by a flap from the temporal region. April 22.—The right lower eyelid was restored. In the winter of 1903 rhinoplasty was performed by König's method.

Intestinal Strangulation from Appendicitis.—Robert F. Weir (*Medical Record*, May 23, p. 801) relates the following case in which the diagnosis was obscure. A woman, aged 21, was seized with abdominal pain and vomiting. At the end of forty-eight hours, when she was admitted to hospital, the vomiting persisted and the bowels had not acted for four days, though many purgatives had been given. On examination of the abdomen nothing was felt and there was neither rigidity, distension, nor specially tender point, but pain was complained of whenever pressure was made on the abdomen. When the patient's attention was distracted, however, she bore pressure well. Nothing was felt in the right iliac fossa. During the day the vomiting continued and pain occurred at intervals. There was some leucocytosis (13,000). Thus the symptoms were only vomiting and unreliable pain in an apparently hyperæsthetic woman. The temperature ranged from 99° to 100° and the pulse from 80 to 96. On the following day the symptoms persisted. On the third day of residence in hospital the condition underwent change. There were central abdominal meteorism and marked change in the facial aspect, while the vomited matter became browner and more offensive. The leucocytes increased to 17,000. Median laparotomy showed in the right iliac fossa, near the pelvic edge, a mass of contracted purplish brown small intestines and obstruction from a band which ran upwards towards the root of the mesentery. Under it a loop of some 8 or 10 ins. of intestine was bound down and constricted.

It was thought to be a Meckel's diverticulum, but while endeavouring to trace the band it yielded and the end of an appendix 5 or 6 ins. long came into view, releasing the constricted loop of intestine which speedily resumed its normal colour. The end of the appendix was bulbous and deeply congested and had been attached to the right side of the lumbar spine just above the brim of the pelvis. The adjacent intestinal loop showed recent fibrinous exudation. The appendix was removed and its stump was cauterised and inverted into the cæcum by a purse-string suture. As the peritonitis was so limited the abdominal wound was closed without drainage. Recovery ensued.

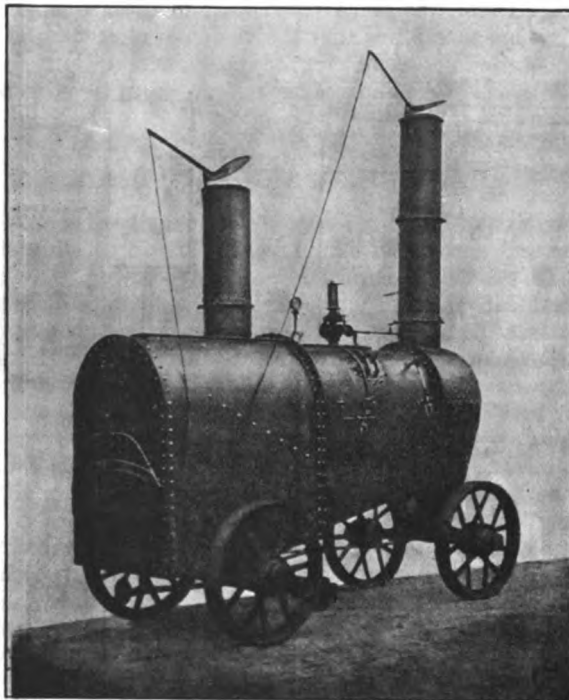
Acute Lymphatic Leukæmia with numerous Subcutaneous Nodules (Chloroma).—J. H. Steven] (*Glasgow Med. Journ.*, July 1903) describes a case of this rare condition which has received attention only recently. A lad, aged 19, was admitted to hospital on January 16, 1902. He had had good health until two months before, when he had an attack of diarrhœa which compelled him to give up work. He was then exposed to privation. His complexion was pasty, his mucous membranes were pallid, while his skin was hot and covered with beads of perspiration. His pulse was 100 and his temperature ranged up to about 100°. His gums were soft and spongy with blood clots adherent to them. In the skin were bluish shotty nodules. Over the pulmonic area a soft blowing systolic murmur, and over the vessels of the neck a harsh systolic murmur were heard. The liver extended an inch below the ribs. The blood was deficient in fibrin and pressure was required to stop the flow after puncture. It contained hæmoglobin 15 per cent., red corpuscles 766,000, and white corpuscles, 491,600 per cubic millimetre. On January 22, there were on the front of the trunk about twelve steel-coloured nodules varying in size from a millet seed to some of the circumference of a threepenny-piece. There was a nodule on the upper arm and one, the largest of all, on the small of the back. The cervical axillary and inguinal glands were enlarged. The spleen could not be felt, but its area of dulness seemed to be increased. The temperature ranged between 101° and 102°. Much "coffee-ground material" was vomited and death occurred on January 23. At the necropsy the subcutaneous nodules were on section of a greenish-grey colour and of the consistence of lymphatic glands. The cervical and axillary glands were much enlarged and greenish-grey. The pericardium contained a little greenish serum and showed a purpuric eruption. The thymus was enlarged and greenish. The blood in the great vessels was greenish and resembled solidified green pus. There was fatty degeneration of the heart and a purpuric mottling beneath the endocardium. The mesenteric glands were enlarged and a few showed caseous-like necrosis. In the renal cortex were nodules like those in the skin. On the stomach were purpuric patches. The pia-arachnoid showed a purpuric mottling and there were hæmorrhages in the brain. The bone marrow was dark greenish. Examination of the blood gave large lymphocytes 94.6 per cent., small lymphocytes 1.4 per cent., polynuclears 2.7 per cent., and eosinophiles 1.3 per cent. Section of the medulla and cord showed great dilatation of the vessels with lymphocytes. The greenish coagula in the heart and great vessels consisted almost

entirely of mononuclear non-granular cells lying in a delicate fibrinous reticulum. A few nucleated red corpuscles were seen. The lymphatic glands were pale greenish on section and crowded with lymphocytes. The pulp of the spleen was similarly over-run with mononuclears. In the bone marrow the proper elements were replaced by mononuclears. The persistent and enlarged thymus was so infiltrated with leucocytes as to resemble a lymphatic gland. The thyroid presented a similar appearance. The lymphoid tissue of the alimentary canal was much increased and there was so much infiltration of the mucous membrane that the glandular elements were obscured. The subcutaneous nodules were composed of dense collections of mononuclear cells. Elsewhere the fibres of the subcutaneous tissue were separated by a diffuse leucocyte infiltration.

II.—HYGIENE AND PATHOLOGY.

The Destruction of Camp Refuse.—The difficulty of coping adequately with the refuse and garbage in camps is well known to all who have seen field service. This difficulty is no less prominent during peace manœuvres than in an actual campaign. The problem of how to dispose of this material arises not only from its amount, but also from the fact that in our Service there exists no body of men either organised or trained for this special duty. During peace time we hand this important work over to a civil contractor, with the result that for field service and occasions when no civil contractor is available there is neither organisation nor competent *personnel* to carry out this essential duty. Whether we shall ever see a true sanitary corps formed, organised, trained and commanded by officers familiar with the theory and practical working of sanitary science remains to be seen; but apart from these considerations of executive, there remains the great problem of how to dispose of the enormous mass of refuse material which so rapidly collects in every camp. Opinion is unanimous that destruction by fire is the proper mode of destroying matter of this nature; to bury it is not only impracticable, but hardly free from risk to the community. In civil life the most successful solution of this problem has been by a development of the practice of cremation; but even under the stable conditions of peace all is not plain sailing. It means the expenditure of considerable sums of money in the installation of an elaborate destructor, combined with the organising of a large *cadre* of men to bring the refuse to a central dépôt for final destruction. In military life these difficulties are no less, possibly even greater, owing to the exceptional conditions under which soldiers so often carry out their duties. When we come to think of applying civil methods of refuse destruction to army conditions, our first and greatest difficulty is the matter of a destructor. For permanent garrisons the employment of installations such as are met with in urban civil communities is merely a matter of expense; but in camps, especially those of a more or less temporary nature, the erection and maintenance of an elaborate cremator is less easy of attainment. The need of some practicable and at the same time movable destructor for camp use has long been felt. In this connection we desire to call attention to a type of destructor made by Horsfall and Co., of Leeds, which we saw working recently at the Sanitary

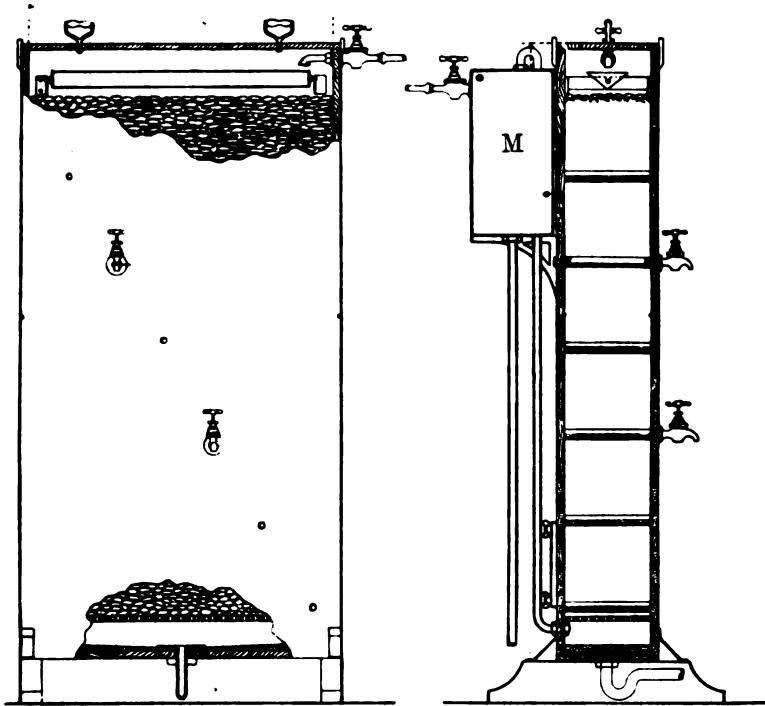
Institute Exhibition in Bradford. Its style and nature can be readily appreciated from the accompanying picture. It must not be supposed that this portable destructor is intended to do its work as it goes along. It is merely a combined furnace and boiler placed on wheels in order that it may be self-contained, while at the same time it may be removed from one locality to another. Its weight is about 6 tons, it can burn $4\frac{1}{2}$ tons



of refuse daily without causing a nuisance, generates power equal to 10 h.p., and costs complete £450. The value of such a movable destructor in many of our scattered camps and cantonments at home, in India and in South Africa, needs no argument. Moreover, the power generated might in many places be turned to profitable work. We hope the day is not far distant when one or more of these destructors will be as much a feature of our camps as are the refuse and garbage shoots of the present day.

The Standardisation of Sewage.—The student of the bacterial treatment of sewage has long been aware that while the principles which underlie the method are well understood, their practical application to individual sewages is largely empirical. This arises from the fact that the factors necessary for obtaining any required standard of purification by bacterial processes are variable and by no means constant for every kind of sewage.

It is only when the necessary factors in the problem are known in terms of some exact measurement that we can hope to find an accurate solution for each case. Before attempting to design bacterial installations the values of the following factors must be known for any particular sewage: (a) The volume of liquid to be discharged upon each foot of filter bed per hour, or each acre for twenty-four hours; (b) the period of time between each discharge; (c) the air required for aëration per cubic foot or yard of filter; (d) depth of filter required for any given standard of purification. If we



take the standard of purification required in any particular case as the "optimum," the optimum adjustment of the above factors is the one which gives the required standard at the minimum depth of filter with maximum discharge.

It is notorious that vast sums of money have been and are still being spent upon experiments with sewage in which the essential factors for success are quite unknown. In a valuable paper read before the recent meeting of the Sanitary Institute at Bradford, Mr. W. D. Scott-Moncrieff suggests an installation for determining these necessary factors, and makes an earnest plea for the bacterial purification of sewage to be approached in a logical and scientific way. He suggests an apparatus which consists of an air-tight chamber or box of standard dimensions occupying a floor space of 4 feet by 3 feet and being 8 feet in height. It contains a unit of filtering

material representing the actual working of a filter bed, 6 feet in depth. By an automatic tipper provision is made to determine accurately the volume and rate of delivery of sewage, also by means of a metre (M) of the amount of air necessary for any standard of purification. The method of collecting samples of effluent is shown in the diagram, provision being made by means of taps fixed *en echelon* for taking them simultaneously at every foot level from one to six. A series of observations made with this standardiser enables one to construct a diagram, from which the character of an effluent, obtainable from a given sewage under given conditions, can be accurately determined. The same observations also provide reliable data for preparing specifications of the plant and installation necessary for the purification of any given sewage, either with or without preliminary digestion in an anaërobic chamber. We confess to being much impressed with not only the scientific value of this apparatus, but also with its practical importance to all called upon to either advise as to, or actually construct, bacterial sewage installations.

The Life Cycle of the Yellow-Fever Germ.—It is now generally recognised that this germ requires two special hosts for the completion of its life cycle, one of them being the body of a non-immune human being and the other a species of mosquito. From the analogy of malaria we may conclude that the yellow-fever germ, which has not yet been isolated, must be a protozoon and not a bacterium, also that it goes through phases of development similar to those of the malaria parasite. While the human subject is doubtless the permanent host for the germ of malaria, it is the *Stegomyia* mosquito which acts the part of permanent host for the yellow-fever germ, the short sojourn of which in the body of infected man is such as might be expected of a parasite going through phases of sexual reproduction in the body of its intermediate host. Analysing the facts known as to the etiology, epidemiology and clinical history of yellow fever, the striking circumstance is not so much the parallelism as the contrast between the course of events in malaria and yellow fever. Discussing this question in the *Revista de Medicina Tropical*, April, 1903, Carlos Finlay makes the following deductions from his work: "The yellow-fever germ being the parasite of a small insect, must be a much smaller protozoon than the malaria germ which is a parasite of man. The reality of ultra-microscopic germs as promoters of infectious disease being now scientifically demonstrated, it is possible that the germ of yellow fever may be one of that class. For other infectious diseases, the germs of which have escaped detection, it may be surmised that the germs are, or at one time were, parasites of a very diminutive insect host, which either continues unsuspected or may have become extinct. The sojourn of the yellow-fever germ in the human body is of short duration, in accordance with its object, which is mainly to secure the preservation of the species by sexual reproduction. The function of sexual reproduction is accompanied by the elaboration of powerful toxins, to which must be directly attributed the attack of yellow fever. Apart from the elimination or destruction of the mosquitoes, our main reliance for the prophylaxis of yellow fever and malaria should consist in preventing the transfer of the parasite from the intermediate to the permanent

host; this is comparatively easy in yellow fever, but for malaria presents almost insurmountable obstacles. There is no great difficulty in preventing a yellow-fever patient (intermediate host) from being bitten by and infecting the healthy *Stegomyia* (permanent host)."

Certain interesting facts concerning the viability of the *Stegomyia fasciata*, or yellow-fever mosquito, are given in the same publication by Guiteras, who, by an experiment made in his laboratory at Havana, found that of eleven mosquitoes hatched on August 1, 1902, and which were made to bite on the 5th of the same month a yellow-fever patient, no less than five lived over 100 days, and one as long as 154 days. These mosquitoes were preserved in a wide-mouthed glass jar covered with gauze; inside the jar were placed a glass of water, some grass and a lump of sugar. As the *Stegomyia* retains its infectivity during all its life, the facts which refer to its duration of life are of great practical interest. Finlay had shown that the life of the mosquito is limited to a few days if deprived of water; to determine whether in a state of hibernation the insects could perhaps live without water, Guiteras retained in a wire-gauze cage thirty-three female *Stegomyia* without water, grass, or sugar, and placed them in a dark box at a temperature of 10° C. After forty-five days sixteen mosquitoes survived, and on the eighty-seventh day three were still living.

The Bacteriology of the Blood in Scarlet Fever.—In spite of much work, it must be admitted that we are still largely in the dark as to the precise cause of this disease. Numerous examinations of the blood in fatal cases of scarlet fever have been made by various observers. In some a coccal infection has been found, commonly a streptococcus, while in a smaller number of cases the isolated organism has been either a staphylococcus or the pneumococcus. Klein was one of the first to describe cocci as the cause of scarlet fever. For years he has upheld the *Streptococcus conglomeratus* as this cause, and maintains that this organism does not occur in healthy persons, or such as have non-scarlatinal angina. Others, notably Marignac, Mery, Seitz and Llawyk, have all found streptococci in the blood of scarlet-fever patients. Hlava has recently described a similar organism which in many respects resembles the ordinary pathogenic streptococci, but he claims first the individual peculiarity of forming crumbling masses in saccharose bouillon, the masses consisting of short chains of atypical and pleomorphic cocci embedded in homogeneous membrane. The organism is said by Hlava (*Centralb. f. Bakter.*, 1902, xxxii., 263) to be of feeble virulence, and that only when grown upon serum. He has demonstrated its presence in the blood during life in six cases, and designates it as *Leuconostoc hominis*. Much further work is necessary before this can be accepted as a definite and distinct form. ▶ |

Hektoen, in the *Journal of the American Med. Assoc.*, March 14, 1903, approaches this subject by presenting the results of a bacteriological examination of the blood during life of cases of scarlet fever with special reference to general streptococcus infection in this disease. Blood from which to make the cultures was obtained by puncturing a vein in the forearm after careful disinfection of the skin. A sterilised glass syringe was employed, provided with an iridio-platinum needle. One cc. of blood

was used and mixed with 100 cc. of bouillon. In twelve out of a hundred cases streptococci were found. They were relatively more frequent in the older patients, but, as the streptococcæmia in some cases was transient, it is possible that in many cases they may have escaped detection. Positive results were more frequent in severe cases. The prevalent idea is that streptococci are rarely found in the blood of other than fatal cases, and that they play a specific part in the scarlatinal process. Hektoen's research on the blood of scarlet-fever patients during life favours the view that streptococcal infection is secondary, because these organisms are absent in the large majority of cases. Streptococci appear to occupy about the same relation to scarlet fever as they do to diphtheria, if we may judge from the frequency of streptococcus infections in these diseases. Hektoen advances the hypothesis that there are two infections co-existent in the oro-pharyngeal cavity in scarlet fever. The cause of the specific primary infection, he says, is unknown; the second infection is the streptococcal, which may be regarded as practically constant, because there seems to be in all cases of the disease a marked increase in the number of streptococci in the throat as compared with the normal condition. It is not, however, quite clear that, if we except the severe fatal cases, this infection is generalised.

Corps News.

EXTRACTS FROM "LONDON GAZETTES."

ROYAL ARMY MEDICAL CORPS.

Lieut.-Col. H. J. Barnes is placed on temporary half-pay on account of ill-health, dated July 18, 1903.

Lieut. F. L. Henderson, from the Seconded List, to be Lieutenant, dated July 7, 1903.

Lieut.-Col. J. Armstrong retires on retired pay, dated July 29, 1903.

Capt. R. T. Brown is placed on temporary half-pay on account of ill-health, dated May 13, 1903.

The undermentioned Captains to be Majors, dated July 28, 1903 :—

F. J. W. Porter, D.S.O., O. L. Robinson, C. E. G. Stalkartt, M.D., T. W. Gibbard, M.B., C. J. Healy, M.B., H. J. M. Buist, D.S.O., M.B., G. B. Stanistreet, M.B., F. J. Wade-Brown, W. E. Hardy, J. E. Brogden, G. W. Tate, M.B., N. Faichnie, M.B., T. J. Lenehan, M.B., F. McDowell, F. W. Begbie, I. A. O. MacCarthy, C. W. Duggan, M.B., J. C. Jameson, M.B.

Lieut. F. C. Lambert, from the seconded list, to be Lieutenant, dated August 1, 1903.

The undermentioned Lieutenants are confirmed in that rank :—

J. G. Bell, M.B., M. G. Winder, J. Gatt, M.D., T. S. Coates, M.B., A. E. B. Wood, M.B., J. C. G. Carmichael, M.B., R. H. Bridges, J. A. W. Webster, J. B. Meldon, R. C. Wilmot, C. W. Holden, H. B. Kelly, M.B., E. M. Pennefather, G. H. J. Brown, M.B., B. H. V. Dunbar, M.D., D. Ahern, D. G. Carmichael, M.B.

The temporary rank of Captain in the Army granted to Temporary Lieut. M. Taylor is dated July 2, 1902, and not as stated in the *Gazette* of September 9, 1902.

Lieut.-Col. M. D. O'Connell retires on retired pay, dated July 25, 1903.

ROYAL ARMY MEDICAL COLLEGE.

Capt. C. E. P. Fowler, Royal Army Medical Corps, to be an Assistant Professor, vice Major W. H. Horrocks, M.B., Royal Army Medical Corps, who has vacated that appointment, dated July 29, 1903.

ARMY MEDICAL RESERVE OF OFFICERS.

Surg.-Major James Mackay, having resigned his appointment in the Volunteers, ceases to be an officer in the Army Medical Reserve of Officers.

Surg.-Capt. W. J. Lawrie, M.D., having resigned his appointment in the Volunteers, ceases to be an officer in the Army Medical Reserve of Officers.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Lieut. E. W. Bartholomew to be Captain, dated June 18, 1903.

The undermentioned Supernumerary Officers are absorbed into the Establishment :—

Capt. T. W. G. Kelly, M.D., dated August 1, 1903 ; Capt. H. E. Mortis, dated August 1, 1903 ; Capt. J. E. O'Connor, M.B., dated August 1, 1903 ; Lieut. M. A. Cholmeley, dated August 1, 1903 ; Lieut. H. Fox, M.B., dated August 1, 1903.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

The Manchester Companies.—George Fyfe-Watson, Gent., to be Lieutenant, dated July 25, 1903.

The Glasgow Companies.—The undermentioned Captains to be Majors :—

J. McGregor Robertson, M.B., dated August 8, 1903 ; A. Moyes, M.B., dated August 8, 1903.

The Aberdeen Company.—Lieut. J. D. Noble, from the Gordon Volunteer Infantry Brigade Bearer Company, to be Lieut., dated August 15, 1903.

VOLUNTEER INFANTRY BRIGADE BEARER COMPANIES.

5th London.—Surg.-Capt. J. G. Fraser, M.B., 19th Middlesex Volunteer Rifle Corps, to be Captain, and to command under Para. 55a, "Volunteer Regulations," dated July 25, 1903.

West Kent.—Frederick Burroughs Jefferiss, Gent., to be Lieut., dated July 11, 1903.

The Gordon.—Lieut. F. Kelly, M.D., from the Aberdeen Company of the Royal Army Medical Corps (Volunteers), to be Lieut., and to command under Para. 55a, "Volunteer Regulations," dated August 15, 1903.

VOLUNTEER INFANTRY BRIGADES.

South Lancashire.—Surg.-Major F. J. Knowles, 2nd Volunteer Battalion South Lancashire Regiment, to be Brig.-Surg.-Lieut.-Col. whilst holding the appointment of Senior Medical Officer of the Brigade, dated July 11, 1903.

IMPERIAL YEOMANRY.

Surg.-Capt. John Anderson, M.B., from 5th (Perthshire Highland) Volunteer Battalion the Black Watch (Royal Highlanders), to be Lieut., dated March 30, 1903.

James Anderson Taylor, M.B., to be Surg.-Lieut., dated March 30, 1903.

VOLUNTEER CORPS.

3rd Lancashire Royal Garrison Artillery.—Alan Young Greenwood, M.B., to be Surg.-Lieut., dated July 18, 1903.

3rd Volunteer Battalion the Duke of Wellington's (West Riding Regiment).—Alexander Waugh (late Surg.-Lieut. in the Battalion) to be Capt., dated June 6, 1903.

1st Volunteer Battalion the Duke of Cambridge's Own (Middlesex Regiment).—Thomas Sprot Allan, Gent., to be Surg.-Lieut., dated July 18, 1903.

21st Middlesex Rifles.—Surg.-Capt. E. Jones resigns his Commission, dated July 18, 1903.

3rd London Rifles.—Surg.-Lieut. G. W. O'F. Clark to be Surg.-Capt., dated July 18, 1903.

1st Nottinghamshire (Robin Hood).—Surg.-Lieut. J. B. Roberts, M.B., to be Surg.-Capt., dated June 27, 1903.

2nd Volunteer Battalion the Prince of Wales's (North Staffordshire Regiment).—Surg.-Major H. J. Fausset to be Surg.-Lieut.-Col., dated July 25, 1903.

1st Volunteer Battalion the Northumberland Fusiliers.—Surg.-Capt. W. B. Mackay, M.D., to be Surg.-Major, dated August 1, 1903.

1st Volunteer Battalion the Royal Sussex Regiment.—Harold Vaughan Pryce, Gent., to be Surg.-Lieut., dated August 1, 1903.

1st (Pembrokeshire) Volunteer Battalion the Welsh Regiment.—Second Lieut. R. D. Evans resigns his Commission, and is appointed Surg.-Lieut., dated August 1, 1903.

6th (Fifehire) Volunteer Battalion the Black Watch (Royal Highlanders).—Surg.-Lieut. J. S. Mackay, M.D., to be Surg.-Capt., dated August 1, 1903.

1st Herefordshire.—Lieut. J. N. Macmullen resigns his Commission and is appointed Surg.-Lieut., dated August 1, 1903.

3rd (Renfrewshire) Volunteer Battalion Princess Louise's (Argyll and Sutherland Highlanders).—Surg.-Capt. J. Strang, M.B., to be Surg.-Major, dated August 1, 1903.

1st Northumberland Royal Garrison Artillery.—Surg.-Lieut. R. A. Kesham to be Surg.-Capt., dated August 8, 1903.

1st Volunteer Battalion the King's Own (Royal Lancaster Regiment).—Surg.-Lieut. R. J. Morris to be Surg.-Capt., dated August 8, 1903.

4th Volunteer Battalion the King's (Liverpool Regiment).—Surg.-Lieut. R. Fielding-Ould, M.D., to be Surg.-Capt., dated August 8, 1903.

1st Volunteer Battalion the Dorsetshire Regiment.—Surg.-Capt. W. G. Brett resigns his Commission, dated August 8, 1903.

1st Cheshire and Carnarvonshire Royal Garrison Artillery.—Capt. J. Oldershaw, M.D., resigns his Commission, dated August 15, 1903.

2nd Volunteer Battalion the King's (Liverpool Regiment).—Surg.-Lieut. H. D'A. Blumberg to be Surg.-Capt., dated August 15, 1903.

3rd Volunteer Battalion the Lincolnshire Regiment.—Surg.-Lieut. J. M. Duncan, M.B., to be Surg.-Capt., dated July 4, 1903.

2nd Volunteer Battalion the Worcestershire Regiment.—Surg.-Lieut. C. A. Corke to be Surg.-Capt., dated August 15, 1903.

The Volunteer Officers' Decoration has been conferred upon the undermentioned Officers of the Volunteer Force:—

1st Newcastle-upon-Tyne R.G.A. (Volunteers).—Surg.-Lieut.-Col. Arthur Taylor Wear.

2nd Volunteer Battalion the Sherwood Foresters (Nottinghamshire and Derbyshire Regiment).—Surg.-Major William Sandham Symes, Surg.-Capt. William Moxon.

1st (Hallamshire) Volunteer Battalion the York and Lancaster Regiment.—Surg.-Lieut.-Col. John Wise Martin, M.D.

2nd Volunteer Battalion the Lancashire Fusiliers.—Surg.-Major William Pooley.

EXTRACTS FROM ARMY ORDERS. — A.O. 124 states that in future the existing pattern Staff saddle will be the only one used by mounted officers, but officers may use saddlery now in their possession until worn out. The bridle will also be universal, namely, the present pattern Staff head-collar with bridoon and reversible Portsmouth bit. In cases where the Portsmouth bit is unsuitable officers may substitute another pattern. Breast-plates are abolished. On the subject of ornaments a further order will be issued.

A.O. 131 authorises the following rates of money allowance in lieu of forage for the United Kingdom and Channel Islands from July 1, until further order. For Belfast, Eastern, North Eastern, Scottish, South Eastern, Southern, Thames and Woolwich districts, each 1s. 4d. For Aldershot, Cork, Dublin, Home, Salisbury Plain and Western, 1s. 5d. For North Western, 1s. 6d.; and for Channel Islands 1s. 10d.

A.O. 133 intimates that a revised edition of Section V. Equipment Regulations for the R.A.M.C. details has been approved. A.O. 101 of 1898, and 205 of 1902, and the Details of Equipment for R.A.M.C. with Depot and Training School promulgated therewith are cancelled.

O.A. 134 notifies that the following amendment will be made in the Regulations for Army Medical Services. In Para. 559 *after* the word "recruit" in line 1 *insert* "(including Militia)." A.O. 136 makes the confirmatory amendment to Para. 230 of Militia Regulations.

A.O. 139 intimates that Army Book 178, that is, the Medical Case Book, has been cancelled.

A.O. 140 contains provisions amending the regulations relating to Appointments, Pay, and Non-effective Pay. Among them is one in substitution of Art. 375 of the Royal Warrant, having reference to pay of Civilian Medical Practitioners. It states that "when a detachment of our Army is not within reach of any officer on full pay of Our Royal Army Medical Corps, of any officer of Our Army Medical Reserve or of a Militia medical officer on full pay, or of a retired military medical officer or Militia medical officer in receipt of pay under this Our Warrant, a civilian qualified to practise medicine and surgery may be engaged by the commanding officer to render medical attendance to the officers and men belonging to the detachment and to other persons entitled thereto at the public expense, at the undermentioned yearly rates (which include the list of medicines), calculated as laid down in Art. 378: If there are less than ten persons, £5; if ten persons or more, for every complete 25 or portion of 25, provided that the total emoluments for all services, inclusive of the examination of recruits, shall not in any instance exceed £1 for any one day, £10."

A.O. 144 directs that Recruits brought forward for discharge within three months of enlistment as medically unfit for further service will no longer be examined by medical boards. P.M.O's. of divisions or districts will decide as to the unfitness or otherwise of such men for continuing in the Service. Para. 1805 (iii.) (4) of the King's Regulations, and Para. 511 of Regulations for Army Medical Services, will be amended so far as affected by this order.

A.O. 154 cancels Para. 561 of Regulations for Army Medical Services.

FOREIGN SERVICE ROSTER.—The undermentioned Officers have been warned that they will be required to proceed abroad during the forthcoming trooping season, and that their probable destinations will be as stated against their names.

Major F. MacDowell, India.
 Lieut.-Col. F. Treherne, India.
 Major A. O. Fitzgerald, India.
 Major R. Caldwell, India.
 Major J. C. Morgan, India.
 Major G. Raymond, India.
 Major M. T. Yarr, India.
 Major G. E. Moffett, India.
 Major H. M. Sloggett, Malta.
 Major J. R. Mallins, Canada.
 Major N. C. Ferguson, India.
 Major E. Davis, India.
 Major W. T. Mould, India.
 Major W. L. Gray, Malta.
 Lieut.-Col. J. C. Haslett, India.
 Lieut.-Col. J. D. T. Reckitt, India.
 Major J. J. Russell, India.
 Major R. J. A. Durant, India.
 Major J. Fallon, India.
 Lieut.-Col. T. Archer, India.
 Major F. R. Newland, India.
 Major W. P. Squire, India.
 Major S. C. Philson, India.
 Major F. A. Saw, India.
 Lieut.-Col. J. L. Hall, India.
 Major C. W. Reilly, India.
 Lieut.-Col. T. P. Woodhouse, India.
 Major F. Smith, D.S.O., West Africa.
 Major J. W. Jennings D.S.O., India.
 Major M. J. Sexton, India.
 Lieut.-Col. E. J. E. Risk, India.
 Major A. P. Blenkinsop, India.
 Major J. B. Wilson, India.
 Major S. Butterworth, India.
 Lieut.-Col. C. W. S. Magrath, India.
 Major J. Donaldson, India.
 Major C. S. Sparkes, India.
 Lieut.-Col. G. E. Weston, Bermuda.
 Major J. Paterson, Bermuda.
 Capt. H. A. Berryman, Malta.
 Capt. C. S. Smith, India.
 Capt. J. F. Martin, India.
 Capt. A. F. Heaton, India.
 Capt. A. W. Hooper, D.S.O., India.
 Capt. C. W. Profeit, India.
 Capt. R. M. le H. Cooper, India.
 Capt. W. C. Croly, India.
 Capt. D. O. Hyde, India.
 Capt. G. J. Houghton, India.
 Capt. D. E. Curme, India.
 Capt. D. O. B. Wroughton, India.
 Capt. H. C. French, Egypt.
 Capt. F. A. Symons, Malta.
 Capt. C. B. Lawson, Malta.
 Capt. W. Tibbits, India.
 Capt. H. W. H. O'Reilly, Hong Kong
 Capt. N. Tyacke, Egypt.
 Capt. G. A. Moore, India.
 Capt. C. O'C. Hodgens, Jamaica.
 Capt. W. G. Beyts, India.
 Capt. J. G. Berne, India.
 Capt. J. Grech, India,
 Capt. E. M. Williams, Hong Kong.
 Capt. L. A. Mitchell, India.
 Capt. C. H. Carr, India.
 Capt. W. D. Erskine, Egypt.
 Capt. F. W. Hardy, India.
 Capt. E. H. Condon, Jamaica.
 Capt. K. M. Cameron, Ceylon.
 Capt. B. W. Longhurst, Cyprus.
 Capt. H. S. Thurston, North China.
 Lieut. S. B. Smith, India.
 Lieut. H. G. Pinches, India.
 Lieut. M. C. Beatty, India.
 Lieut. J. T. Johnson, India.
 Lieut. E. F. L'Estrange, India.
 Lieut. J. H. R. Winder, India
 Lieut. D. L. Harding, India.
 Lieut. J. Conway, India.
 Lieut. W. L. Steele, India.
 Lieut. C. D. Myles, India.
 Lieut. C. A. J. A. Balck, India.
 Lieut. R. Storrs, India.
 Lieut. R. V. L. Foster, India.
 Lieut. F. A. H. Clerke, India.
 Lieut. G. A. K. H. Reed, India.
 Lieut. G. W. Smith, India.
 Lieut. J. W. S. Seccombe, India.
 Lieut. J. M. H. Conway, India.
 Lieut. S. M. W. Meadows, India.
 Lieut. H. V. Bagshawe, India.
 Lieut. D. S. Skelton, India.
 Lieut. H. G. S. Webb, India.
 Lieut. W. W. Browne, India.
 Lieut. R. Rutherford, India.
 Lieut. W. D. C. Kelly, India.
 Lieut. N. E. J. Harding, India.
 Lieut. W. C. Rivers, India.
 Lieut. R. J. Franklin, India.
 Lieut. A. B. Smallman, India.
 Lieut. W. F. Tyndale, C.M.G., India.
 Lieut. P. Davidson, D.S.O., India.
 Lieut. J. McKenzie, India.
 Lieut. W. B. Taylor, India.
 Lieut. N. D. Walker, India.
 Lieut. A. H. Hayes, India.
 Lieut. H. J. Crossley, India.
 Lieut. R. B. Ainsworth, India.

It is probable that a few more officers will be required.

LEAVE FROM ABROAD.—The following Officers have arrived home on leave:
 Surg.-Gen. T. O'Farrell, Lieut.-Col. R. H. Forman, Major T. Browning, Capt. E. A. Bourke, Capt. A. E. Thorp, Major E. S. Marder.

POSTINGS.—The following distribution of Officers has recently been made:—
 Capt. H. C. French, manœuvres pending embarkation for service abroad.
 Capt. C. W. Profeit, manœuvres pending embarkation for service abroad.

Capt. A. F. Heaton, manœuvres pending embarkation for service abroad.
 Capt. A. W. Hooper, D.S.O., manœuvres pending embarkation for service abroad.
 Capt. R. M. le H. Cooper, manœuvres pending embarkation for service abroad.
 Capt. H. A. Berryman, manœuvres pending embarkation for service abroad.
 Capt. C. T. Samman, Woolwich.
 Capt. J. Grech, manœuvres pending embarkation for service abroad.
 Capt. W. Tibbits, manœuvres pending embarkation for service abroad.
 Capt. B.W. Longhurst, for manœuvres, and afterwards to North-Eastern District.
 Capt. J. R. McMunn, for manœuvres, and afterwards to Ireland.
 Capt. E. M. Williams, Southern District.
 Capt. C. E. Pollock, Home District.
 Capt. G. St. C. Thorn, Dépôt R.A.M.C.
 Capt. F. M. Mangin, South-Eastern District.
 Capt. St. J. B. Killery, South-Eastern District.
 Capt. W. J. Taylor, Home District.
 Capt. S. F. St. D. Green, Ireland.
 Capt. A. E. C. Keble, Thames District.
 Capt. C. M. Fleury, Salisbury Plain.
 Capt. M. Boyle, Scottish District.
 Capt. K. B. Barnett, Aldershot.
 Capt. A. C. Fox, Scottish District.
 Capt. H. V. Pryne, Woolwich.
 Capt. F. Kiddle, Western District.
 Major S. F. Freyer, C.M.G., Home District.
 Major F. W. H. D. Harris, North-Eastern District.
 Lieut.-Col. C. A. Webb, South-Eastern District.
 Lieut. M. C. Beatty, Ireland.

CHANGE OF STATION.—The following changes of Station have taken place :—
 Major G. Bent, from Warwick to Chester.
 Capt. D. E. Curme, from Penally to Devonport.
 Lieut. W. D. C. Kelly, from Curragh to Cork.
 Lieut. R. Rutherford, from Curragh to Cork.
 Lieut. W. C. Rivers, from Curragh to Cork.
 Lieut.-Col. J. McLaughlin, retired, has been appointed to the Recruiting Dépôt at Bradford.

EXAMINATION FOR PROMOTION.—The following Officers, serving abroad, have passed in "Army Medical Organisation," "Sanitation and Epidemiology," and the "special subject" for promotion to Lieut.-Col.: Major J. Ritchie, Singapore; Major S. R. Wills, Maritzburg; Major A. Dodd, Gibraltar; Major E. H. L. Lynden-Bell, Malta; Major D. V. O'Connell, Malta; Major A. de C. Scanlan, Malta.

The following officers, serving abroad, have passed in Military Law: Major S. R. Wills, Maritzburg; Major E. H. L. Lynden-Bell, Major D. V. O'Connell, Malta; Major de C. Scanlan, Malta; Major H. S. Peeke, Halifax, N.S.

We would remind our readers that the next examinations of Lieutenants for promotion to the rank of Captain and of Majors for promotion to Lieutenant-Colonel will commence on the first Monday in November. The examination will be held at the same time and place as that of Lieutenants and Captains of other corps.

Lieutenants before promotion to Captain are required to pass in subjects (a), (b), (c) and (h), i.e., (a), (b) and (c) as laid down in Appendix VII., King's Regulations, and (h) as follows :—

(h) Duties and accounts connected with military hospitals and hospital supplies (Barrack, Ordnance Equipment, and Barrack Services). Duties of medical officers as laid down in the Regulations for the Army Medical Services and in the Standing Orders and Manual for the Royal Army Medical Corps.

There appears to be often some uncertainty in the minds of officers as to when they may next have an opportunity of being examined for promotion, it is therefore desired to make it clearly understood that Majors R.A.M.C. are examined

for the rank of Lieutenant-Colonel and Lieutenants R.A.M.C. for the rank of Captain at the same times and places as Captains and Lieutenants of other corps.

It is also pointed out that as regards the subject of Military Law, Lieutenants R.A.M.C. are required to pass the same examination as Lieutenants of other corps, whilst Captains or Majors R.A.M.C. have the same papers as Captains of other corps.

ROYAL ARMY MEDICAL COLLEGE.—The First Course of Instruction for Captains has come to a close and the result has been a marked success, all having passed for promotion. The examinations in Medicine and Surgery took place on July 27, 28. The examinations in the special subjects and in Hygiene and Bacteriology were held immediately on the termination of the periods of hospital attendance and of the laboratory courses respectively. Out of twenty-six officers, twenty-two obtained the marks necessary to qualify as specialists.

The examiners in Medicine and Surgery were as follows: Sir W. Thompson, Professor Chiene, Dr. Hale White for Dr. Skerritt, Sir Isambard Owen, Dr. Middleton, Mr. Godlee, Dr. Craig, Mr. Jonathan Hutchinson, junr.

Captain A. E. Milner's name has been added to the list of officers attending the second course of instruction published in our last issue. This class commenced work on August 4.

The entrance examination for commissions in the Royal Army Medical Corps was held on July 29, 30 and 31, and August 1. There were in all seventy-five applicants, sixty-two of whom were admitted to the examination. The following were the successful candidates for the thirty vacancies: A. C. H. Gray, M.B.Lond.; D. P. Watson, M.B., D.P.H.Cantab.; T. S. Dudding; C. H. Robertson, M.B.Lond.; F. M. M. Ommaney; J. S. Powell; R. H. MacNicol, M.B., B.Ch.Dubl.; O. Ievers, M.B.Lond.; D. D. Paton, M.B., B.Ch.Edin.; S. L. Pallant; C. R. Bradley; H. H. J. Fawcett, B.A.Cantab.; T. J. Wright; G. A. Kempthorne, B.A.Cantab.; J. T. McEntyre, M.B., B.Ch., B.A.Dubl.; S. E. Lewis, M.B., B.Ch., Glasg.; N. D'E. Harvey, M.B., R.U.I.; J. A. Longley, M.B., B.Ch.Vict.; N. E. Dunkerton; P. J. Hanafin; A. C. Osburn; M. C. Wetherell, M.B., B.S.Durh.; R. T. Collins; W. MacD. Macdowall; F. J. Turner; H. C. Hildreth, F.R.C.S.Edin.; G. S. Mackay, M.B., B.Ch.Edin.; J. D. Richmond, M.B., B.Ch.Glasg.; F. M. G. Tulloch; E. M. Glanville, M.B., B.Ch.Edin.

Guy's Hospital contributed five out of the first six men. Most of the London as well as many of the provincial Schools had representatives amongst the successful candidates.

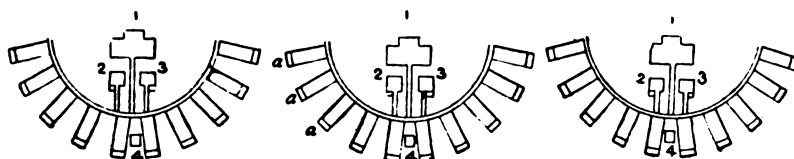
The examination for entrance to the Indian Medical Service has resulted in the addition of sixteen men to its ranks, and these will participate in the junior course of instruction which commences in September. The following seconded Officers will also join the class: Lieuts. Ellis, Henderson, Dawson, Lambert, Hughes, and Patch, R.A.M.C., and Lieuts. Connor and Whale, I.M.S.

The total number of officers attending the senior and junior courses of instruction at the College during the months of September and October will be seventy-seven.

THE PRINCESS LOUISE HOSPITAL, ALTON.—This hospital, which is the final outcome of the Absent Minded Beggar Relief Fund, organised by the *Daily Mail* during the recent war, was formally opened on July 16, by H.R.H. Princess Louise Duchess of Argyll, in the presence of a distinguished company. The money for the purchase of land and the erection of buildings was supplied by public subscription to the amount of £35,000, a further sum of £35,000 being subscribed by the proprietors of the *Daily Mail* to complete the hospital on its present scale. Situated in the parish of Chawton, Alton, Hants, the hospital occupies a site of 152 acres, located in some of the prettiest scenery of the county.

The hospital itself, which consists of three blocks of ten wards each, laid out fan-shape, lies halfway down a grassy slope. All the wards and the centre building in each block are connected by covered ways. The centre building of the first block (A) consists of hospital offices. In the second block (B) is the operating theatre, X-ray room, sterilising room, and dispensary. The centre building of the third block (C) contains a large recreation or dining hall. Additionally, outside block B are the kitchens and sculleries, with store-rooms. Immediately behind the kitchen and some little distance from it is the building devoted to the nursing

staff. The right wing of this building is at present temporarily appropriated as quarters for four married men of the Corps, pending the erection of suitable quarters on the hill, above the canteen. Behind the nurses' block is that for the officers of the hospital. To the left of the officers' quarters and their mess, and slightly



- BLOCK C.**
 1.—Recreation Room or Dining Hall.
 2.—Sanitary.
 3.—Bath Room.
 4.—Heating Stove.

- BLOCK B.**
 1.—Operating Room, &c., Dispensary.
 2.—Sanitary.
 3.—Bath Room.
 4.—Heating Stove.
 a, a, a, Lounge.

- BLOCK A.**
 1.—Offices.
 2.—Sanitary.
 3.—Bath Room.
 4.—Heating Stove.

higher up the hill, are the quarters of the Commandant. Near the entrance gate is a long building containing quarters for orderlies and male nurses. Behind this is a store-house, and in front of it on the left is the laundry and the electric-power house. Electric light is fitted throughout the hospital.

The operating theatre is exceptionally light in character and constructed on the latest principles. In designing the hospital the main object in view was to provide one built more with reference to light and air than had been previously the custom in military practice. The wards are thirty in number, measuring 55 feet long by 20 feet wide, and each containing beds for ten patients. Ventilation in each ward is secured by five Sheringham valves, four Tobin tubes, ten windows, and gauze-protected ventilators on both sides of the roof ridge. The cubic air space provided for each patient is 1,200 feet; also 120 square feet of floor space. To each ward is attached a balcony, 20 feet wide and 8 feet deep, so constructed that convalescents may have the advantage of a lounge. These balconies are provided with windows acting independently, in order that any necessary modification of ventilation can be made. Ten feet of the balcony wall of the ward is hinged and may be lifted up and fastened into the roof, so as to throw more space into the ward if desired. The colour scheme of the wards is a pale French grey on the walls, pale salmon colour on the roof, with pale apple-green in the balconies. The ward floors are covered with half-inch cork felt cemented to tongued planking beneath. The wards are furnished with white enamelled iron bedsteads, Lawson Tait mattresses, with lifting head-pieces. The beds are completed with cotton twill sheeting and specially made woollen rugs dyed in soft tints. At the end of the wards is a room for the nursing sister in charge; also storage room for ward requirements, baths, sinks, &c. All the wards are heated by steam pipes. The drainage system was constructed by Messrs John Aird and Co., at cost price, and is connected with the main sewage system of Alton. All the drainage and plumbing is of the most modern type, with proper man-holes and inspection chambers. The water supply is derived from the Alton water system, which supplies some of the buildings direct and some by means of a special reservoir, containing about 20,000 gallons, in the hospital grounds. The architects were Messrs. E. Shield and H. O. Ellis.

The present staff of this new military hospital consists of Lieut.-Col. W. J. R. Rainsford, C.I.E., R.A.M.C., who is Commandant, Capt. G. Dansey-Browning, Lieut. J. A. Webster, and Lieut. and Quarter-Master A. Morrison doing duty. The nursing staff consists of Miss A. Garriock, matron, Miss Tulloh and Miss Dods as nursing sisters, also Miss Byers, Miss Ward and Miss Hay as staff nurses. Besides these there are a sergeant-major, a staff-sergeant and twenty-seven other non-commissioned officers and men of the Corps doing duty.

The Army is to be congratulated upon this recent addition to its medical establishments, and not a little credit is due to Col. Rainsford and his staff, who have succeeded in getting it into excellent working order in a short time. In many ways the hospital is unique, but before it can be considered complete there is still much to be done, especially in the matter of painting, floor-caulking, and planting of trees in the grounds. On one point only have we anxiety, and that is in regard to a possible fire. Wood enters very largely into the construction of the various buildings, and for this reason it is desirable that a special hand pump be supplied to each of the pavilions; at the same time it is doubtful whether the available water supply is adequate to meet the emergency needs of a possible fire, and to meet this contingency a supplementary high-level water tank, containing at least a quarter of a million gallons, appears to us a matter of importance.

THE LEEDS COMPANY (R.A.M.C.V.) underwent their annual inspection on July 18, on the parade ground of the Leeds Rifles. Col. O'Connell, principal medical officer, North-Eastern District, York, was the Inspecting Officer. The Company was under the command of Major de B. Birch, the other officers present being Lieut. Wear, M.D., Hon. Capt. and Quarter-Master Wilson Gardner (in charge of the transport), and the Rev. J. F. Phillips, Acting Chaplain.

There were ninety of all ranks on parade, including the transport section, two ambulance waggons, with four-horse teams, driven by men of the section, the horses being lent by the Sanitary Department of the Leeds Corporation.

After the company had given a display of company and bearer company drill and had executed special work, such as dressing and bringing in wounded, and caring for them, the Inspecting Officer addressed the company. He said that this was the third year in which he had inspected them, and he regretted that this was the last time he should so meet them. He congratulated them upon the efficiency which they had attained, and upon the manner in which they had maintained their smartness and efficiency.

NOTES FROM SOUTH AFRICA.—During the absence of Surg.-Gen. Clery on leave, Colonel Edge is carrying on the duties of P.M.O. South Africa in Pretoria.

Lieut.-Col. Corker is acting as P.M.O. Cape Colony. Lieut.-Col. Peard, Majors Elderton and Shanahan and Lieut. Mason are at Middleburg, C.C., Major Alexander and Captain Ormsby are at Naupoort, Lieut.-Col. Russell and Captain Ashe are at Wynberg, where Capt. Inkson will soon join. Major Ferguson has sailed for Somaliland in charge of the "Drayton Grange," and it is possible he will stay there. Captain Hardy has assumed the duties of M.O., in charge of Staff, and Embarkation Officer at Cape Town, Major Daly, will probably remain at Stellenbosch until the Scots Greys move to Middleburg.

The "Dunera" sailed for home with about 300 R.A.M.C. under the charge of Majors Browning and Hale. Major Hale was found busily engaged in hauling in mullet over the side of the ship one afternoon. He had good sport, and so had the men he provided with lines. There is an excellent "foul-air exhaust apparatus" on board. It gets rid of 60,000 cubic feet an hour; a most desirable arrangement for every ship.

Huts have been brought out from England and are being erected at Wynberg. Some of these are palatial residences. No. 1 size is intended for Colonels; No. 2 size for Lieut.-Colonels; No. 3 for Majors. All have kitchens, verandah, zinc roofs, and several rooms; and remembering our Kashmir experience, they are highly delectable residences. There is a fair amount of furniture too.

BIRTHS.

ARCHER.—On July 19, at Up Park Camp, Jamaica, the wife of Capt. E. J. S. Archer, R.A.M.C., of a daughter.

HARDY.—On August 12, at Laurel Bank, East Liss, the wife of Major F. W. Hardy, Royal Army Medical Corps, of a daughter.

DEATHS.

PEARD.—It is with very great regret that we have to announce the receipt of news by wire from South Africa of the death of a well-known brother Officer, Lieut.-Col. H. J. Peard, C.M.G., who died from scarlet fever at Middleburg, Cape Colony, on August 18. He entered the Service on July 30, 1881, was promoted Surg.-Major on July 30, 1893, and Lieut.-Col. on July 30, 1901. In addition to two tours of service in India he had served in South Africa since October, 1899. He served in the operations on the N.W. Frontier of India in 1897-98, with the Malakand Field Force, and received medal and clasp. He was mentioned in despatches for his services in the South African War, and was awarded the C.M.G. He also received the Queen's and King's medals for the campaign.

HOYSTED. — Surg.-Major-Gen. Thomas Norton Hoysted, retired list, Army Medical Service, died at Willow Grange, Sidcup, on August 12, aged 68. He joined the Army September 28, 1885; became Surg.-Major-Gen. March 28, 1892; and retired January 11, 1894. He served with the 59th Regiment in the operations before and capture of Canton, December 28 and 29, 1857 (medal and clasp); served with the 54th Regiment in the Indian Mutiny Campaign at the last advance into Oude under Lord Clyde in 1858, including the capture of Fort Amietie (medal); served in the Afghan War, 1878-79, and was present at the capture of the Peiwar Kotal (medal with clasp).

CORPS ORDERS by Surg.-Gen. Sir W. Taylor, M.D., K.C.B., K.H.P., Director-General Commanding.

*Headquarters, War Office,
August 1, 1903.*

The following promotions, to complete establishment, will take effect from the dates specified :—

<i>To be Sergeants.</i>			
Corps No.	Rank and Name.	Date of Casualty.	Remarks.
8,886	Lie.-Sgt. Sparrow, E. E.	3.6.03	{ With seniority next above No. 10, 304 Sgt. A. Dearsley.
9,953	„ Lovegrove, E. J.		
10,011	„ Taylor, J. H.		
11,144	„ McCreeth, A.		
7,991	„ Freeston, J. H.	25.7.03	With seniority next below No. 10,699 Sgt. B. D. Conolly. On being posted to the S.D. Co., R.A.M.C. (M), in accordance with para. 1863 King's Regulations.
12,065	„ McKnight, A. A. E.	1.8.03	{
12,386	„ Purchase, E.		
10,183	„ James, W. J.		
11,862	„ Rose, H. W.		
11,214	„ Squire, W. E.		
11,498	„ Thompson, J.		
11,943	„ Copping, H. J.		
10,073	„ Merchant, W.		
12,365	„ Brodie, W. L.		
11,507	„ Baxter, D. C.		

<i>To be Corporals.</i>			
Corps No.	Rank and Name.	Date of Casualty.	Corps No. Rank and Name.
9,175	Lie.-Cpl. Tasker, J.	1.8.03	11,946 Lie.-Cpl. Gosling, E. J.
10,321	„ Whale, W. T.		12,163 „ Jones, J. I.
10,511	„ Morgan, F.		12,174 „ Billot, S.
11,107	„ Hambrose, P. G.		12,376 „ Walsh, J. B.
11,250	„ Sage, J.		12,402 „ Rondel, T. E.
11,417	„ Bush, A.		13,550 „ Stevens, W. H.
11,613	„ Morris, G. R.		14,326 „ Morman, W. P. S.
11,734	„ Campion, A. H. O.		

<i>To be Lance-Sergeants.</i>				
Corps No.	Rank and Name.	Date of Casualty.	Corps No.	Rank and Name.
8,136	Cpl. Piercy, G.	1.8.03	10,407	Cpl. Vickers, J.
8,883	" Fowler, A.		10,106	" Gooding, E.
8,808	" Davies, C.		11,338	" Grove, W.
11,182	" Dean, F.		11,441	" Sprinks, H.
10,074	" Wilkins, H.		11,029	" Spowage, A.

To be Lance-Corporals.

Corps No.	Rank and Name.	Date of Casualty.	Remarks.
16,045	Pte. Pronger, L. G.	3.6.03	With seniority next below No. 13,664 Lee-Cpl. J. C. Dunn, dated 3.6.03, in accordance with para. 372 Standing Orders R.A.M.C.

Corps No.	Rank and Name.	Date of Casualty.	Corps No.	Rank and Name.
11,075	" Wodhams, S. L.	1.8.03	14,716	Pte. McDwyer, J.
10,012	" Doyle, P.		14,725	" Blackhall, A.
11,583	" McCarthy, W.		14,770	" Buckner, A.
11,649	" Mustill, J. H.		14,817	" Marsden, C.
11,665	" Miller, H. W.		14,958	" Soady, H.
16,216	" Robinson, J. W.		14,967	" Fielder, H. F.
12,025	" Harrold, A. E.		15,096	" Pugh, J. E.
12,155	" McKay, A.		15,808	" Primer, C.
12,743	" Wilson, T. R.		16,002	" Amsden, W.
17,278	" McLennan, J.		16,097	" Bowen, E.
14,424	" Palmer, L. G.		16,115	" Dewberry, E. B.
14,497	" McGray, W. J.		16,177	" Robinson, A. F.
14,517	" Causley, A. T.		16,294	" Godwin, F. E. C.
14,563	" Lewis, A. R.		16,473	" George, W.
14,578	" Smith, G. B.		16,822	" Whipp, H. W.
14,579	" Goodwill, R.		17,183	" Robertson, J. S.
14,617	" Aston, H.		17,229	" Hutchens, W.
14,631	" Breen, A.		18,210	" Love, M.
14,648	" Tompsett, B. G.		12,626	" Heald, H.

Corps No.	Rank and Name.	Date of Casualty.	Remarks.
6,168	" Davies, W.	1.8.03	Special as Clerk
15,429	" Gardiner, C.		Special as Cook.

After Order.

No. 1.

His Majesty's Commission.

The following notice appeared in the *London Gazette*, No. 27,581, dated July 28, 1903.

The East Yorkshire Regiment.—Sergt. Andrew McLean Finnie, from the Royal Army Medical Corps, to be Second Lieut., dated July 29, 1903.

No. 2.

The Director-General has much pleasure in publishing for the information of the whole Corps the following extract from the *London Gazette*, No. 27,582, dated July 31, 1903.

Despatch from High Commissioner Sir F. Lugard to Secretary of State for the Colonies.

34. Colonel Morland makes the following recommendations:—

Staff-Sergt. G. C. W. King, Royal Army Medical Corps, has worked well throughout the operations. He was specially mentioned by the Principal Medical Officer for his services at the storming of Kano.

(This refers to No. 10,046 2 Cl. Staff-Sergt. G. C. W King.)

E. M. WILSON, D.A.D.G.,
Army Medical Service.

THE R.A.M.C. FUND.

The General Meeting was held at 3 p.m., on Monday, June 15, 1903, at the Royal United Service Institution, Whitehall.

The Director-General (Sir William Taylor, K.C.B.) presided at the meeting. He was supported by the late Director-General, Surg.-Gen. J. Jameson, C.B. Nearly 100 officers were present.

The Director-General opened the meeting by giving a full account of the R.A.M.C. Fund, the formation of the Committee, and the inception and gradual growth of the various branches taken up by the Fund; the commencement of the work of establishing memorials, of collecting material for the Historical Record; the work of the Sub-Committees in charge of the Band and Dinner Funds, and of the Compassionate Fund. He explained the action taken by the Committee on the several points brought before it up to the last meeting, and asked for a vote of thanks to Lieut.-Col. Skinner, the Hon. Secretary. This was carried with applause. Continuing, the DIRECTOR-GENERAL said:—

“Now I have read these minutes through somewhat in detail, to put before you in as few words as possible how we now stand; and as this is the first general meeting of the Corps, it is also the first opportunity we have had of hearing what any officer of the Corps has to say on the subject of the various facts, details of which I have read to you. Consequently I shall be very glad if all officers who have got any views to express will now let us hear them. Perhaps it would be as well that we should have once and for all a decision on the subject as to the invitation of guests to the Annual Dinner and so dispose of it. I have just been told there are two points of view from which this question may be looked at. First, the inviting of public guests by the Committee, and second, the invitation of private guests by each individual officer. Well, I shall be very glad to hear what any officer has to say, and I will not express my opinion, but will only point out the impracticability of the second proposal, that each officer should have the privilege of inviting a guest. We have this evening 180 of the Corps dining. Now if you give to these 180 officers the privilege of inviting one guest each, it will be a case of ‘He don’t know where he are!’ I am sure the Secretary to the Dinner will not know where he is. We shall all be mixed up. Above all, it does away with that character of the Dinner which I think ought simply and solely to be a ‘Family Gathering.’ As I have no wish to prejudice opinions I will not say any more.”

The question was then discussed and the meeting resolved that no guests should be invited to the Annual Dinner.

Subsequently, a proposal that a special dinner should be held was brought before the meeting. After some discussion, the following resolution was passed:—
“That the subject of holding a special dinner to which invitations be sent to the representatives of the civil profession, and that other distinguished gentlemen who have shown hospitality and kindness to the officers of the Corps also be invited, be referred to the General Committee for consideration and report.”

Col. May then moved a vote of thanks to the Committee for the admirable way in which they had carried out their duties. This was seconded by Surg.-Gen. Stevenson and carried unanimously.

The Director-General said that before the meeting separated he wished to say one word more, and that was about the coming Journal. “I dare say a great many of you have heard that at last it is an accomplished fact, and on the 1st of next month—July—the Journal will, I hope and believe, be issued. I would only ask you now, gentlemen, that, as a little leaven, you will go about the Corps and endeavour to stimulate all your brother officers to take an active interest in that Journal. We are putting ourselves now before the light of the world, and if we do not put our best foot foremost we may not appear in such a favourable light as we should do. Therefore I would ask you to bear in mind yourselves that there is such a thing as this Journal, and that upon your shoulders rests the responsibility (and I feel perfectly certain that of the officers of our Corps not one will shirk his share of responsibility) for its success. What I ask you is to spread this idea abroad, and not to let our brother officers get careless about it. We are not confined to medicine or surgery, but are open to every branch of science—all the ‘ologies.’ Let us try to bring all our brother officers up to the scratch that none remain backward in supporting the Journal. I think this is one of the most impor-

tant steps ever taken in the Corps. When I entered the Corps the very first thing considered was a Journal, the form and legend of the Journal even was settled; but it is not until now that we have succeeded in it: and now that we have got it, we are under this responsibility, that we must make it a great success."

The Sixth meeting of the Committee was held at 68, Victoria Street, S.W., on Friday, June 26, 1903, at 12 noon. Present:—

Surg.-Gen. Sir William Taylor, K.C.B., K.H.P., Director-General A.M.S. (Chairman).

Surg.-Gen. Sir John B. C. Reade, K.C.B., K.H.S.) Representing
Lieut.-Col. J. F. Beattie.) Retired Officers.

Surg.-Gen. A. H. Keogh, C.B.

Surg.-Gen. W. H. Macnamara, C.B., C.M.G.

Col. W. L. Gubbins, M.V.O.

Col. H. E. R. James.

Lieut.-Col. E. M. Wilson, C.B., C.M.G., D.S.O.

Major R. H. Firth.

Capt. and Quarter-Master G. Merritt.

The Minutes of the fifth meeting were confirmed.

The following resolution passed at the General Meeting on June 15, 1903, was under the consideration of the Committee.

"That the subject of holding a special dinner to which invitations be sent to the representatives of the civil profession, and that other distinguished gentlemen who have shown hospitality and kindness to the officers of the Corps also be invited, be referred to the General Committee for consideration and report."

After some discussion, the Committee came to the following determinations:

- (1) That a special Dinner of the Corps to which guests should be invited should be held, and that the cost of this special dinner should not be borne by the R.A.M.C. Fund.
- (2) That a list of guests, whom it is proposed should be invited, be prepared. (This list may be seen in the Secretary's office.)
- (3) That no private guests be allowed.
- (4) That the dress for the occasion be plain clothes with decorations.
- (5) That the place and date of the special dinner be the Whitehall Rooms of the Hotel Metropole on October 21, 1903.
- (6) That the following sub-committee should make the necessary arrangements in connection with the dinner: Col. Gubbins, Col. James, Lieut.-Col. Beattie, and Lieut.-Col. Wilson.

Lieut.-Col. Skinner was asked to communicate this Report to the officers of the Corps, and to obtain the names of those among the officers residing at Home who are willing to support the Dinner.

A letter from Lieut.-Col. Somerville Large in reply to the resolution contained in Minute 3 of the fifth meeting was before the Committee. Lieut.-Col. Somerville Large, while regretting that the Committee does not consider it desirable to create a trust in the Compassionate Fund, withdrew that portion of his previous letter, and made an offer which was accepted by the Committee in the following terms:—

"That a sum amounting to nearly £1,400—presented by Lieut.-Col. Somerville Large—be placed to the credit of the Compassionate Branch of the Royal Army Medical Corps Fund. The whole of this sum will be spent in subscriptions to obtain the admission of orphan children of warrant officers, N.C.O.'s and men of the Royal Army Medical Corps, into some Charitable School or Institution, in accordance with paragraph 4 (c.) Report of the third meeting of the Committee."

The Director-General notified that he had in the name of the Committee written to Lieut.-Col. Somerville Large accepting his gift with thanks.

The seventh meeting of the Committee was held at 68, Victoria Street, S.W., on Wednesday, August 5, 1903, at 3.15 p.m. Present:—

Surg.-Gen. Sir William Taylor, K.C.B., K.H.P., Director-General A.M.S.
(Chairman).

Surg.-Gen. Sir John B. C. Reade, K.C.B., K.H.S. } Representing
Lieut.-Col. E. Fairland. } Retired Officers.

Surg.-Gen. A. Keogh, C.B.

Surg.-Gen. W. H. McNamara, C.B., C.M.G.

Col. W. L. Gubbins, M.V.O.

Lieut.-Col. E. M. Wilson, C.B., C.M.G., D.S.O.

Major R. H. Firth.

Capt. J. F. Martin (elected by officers R.A.M.C. Mess, Aldershot).

Capt. and Quarter-Master G. Merritt.

(1) The Minutes of the sixth meeting were confirmed.

(2) It was resolved that in order to economise expense in postage and in clerical work it was resolved that the reports of each meeting of the Committee should be published in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, and not separately circulated as hitherto.

Non-subscribers to the Journal will be supplied with a copy of the reports on application to the Hon. Secretary.

(3) The following further arrangements were made with reference to the special Dinner:—

(a) Certain selections were made of additional guests.

(b) It was resolved that invitations should be sent out at once.

(c) The Director-General was asked to take what steps he may consider necessary to fill up such vacancies as may arise from any cause in the list of guests.

(4) The second quarterly report of the Sub-Committee on the Band Fund was considered:—

(a) The accounts were passed as amended, and are appended to these minutes.

(b) No further payments will be made from the R.A.M.C. Fund to the Band Fund for the present, until the large credit balance has been absorbed.

(c) The increase of the salary of the Band-Master by £10 per annum was approved.

(5) The second quarterly report of the Sub-Committee for the Compassionate Fund was considered:—

(a) The accounts were passed as amended and are appended to these minutes.

(b) The Committee approved of a further sum of £400 belonging to the Widows' and Orphans' Fund being placed on deposit.

(c) The grant of 5s. per mensem to a clerk was approved.

(6) It was resolved that it was inadvisable to keep large balances at out stations, and that the balances now outstanding should be gradually absorbed with a view to concentrating the funds at the Bankers of the Fund. Before taking any definite steps in this direction Lieut.-Col. Skinner was asked to ascertain if they will give a better rate of interest for deposits than the Bank rate which they are at present giving, and so place themselves in a similar position with regard to the Fund as those Banks who at present give 2½ per cent. on money deposited with them.

(7) It was noted that Lieut.-Col. Somerville Large, acting on behalf of the Widows and Orphans' Fund of No. 6 General Hospital, South Africa Field Force, had transferred the sum of £1,390 19s. 2d. to the Compassionate branch of the Royal Army Medical Corps Fund.

B. SKINNER, Lieut.-Col.,

Hon. Sec.

68, Victoria Street, S.W.

August 5, 1903.

ROYAL ARMY MEDICAL CORPS.—BAND FUND.

BALANCE SHEET FOR SECOND QUARTER, 1903.

RECEIPTS.		EXPENDITURE.	
Date.	From whom received.	Date.	On what account.
			£ s. d.
April 20 ..	Hon. Sec., R.A.M.C. Mess ..	April 30 ..	Pay of Band (April) ..
May 12 ..	" " " " ..	May 30 ..	" " (May) ..
June 10 ..	" " " " ..	June 15 ..	Expenses of Band to London (Annual Dinner) ..
" 12 ..	Transfer from R.A.M.C. Fund (First Allowance for First Quarter) ..	" 30 ..	Pay of Band (June) ..
April-June	244 Subscriptions of 5s., as per Pass Book, paid to Messrs. Holt and Co. ..	" ..	Messrs. Boosey and Co. (Music) ..
" "	On Account of Travelling Expenses, &c., of Band to Netley, London, &c. (remainder included in Third Quarter) ..	" ..	Mr. G. Asch (Music)..
		" ..	Messrs. Gale and Polden (Books, Programmes, &c.) ..
		" ..	Postage for Second Quarter ..
		" ..	Master Tailor, R.A.M.C. (Cloth for Badges of Band) ..
		" ..	Messrs. Holt and Co. ..
		" ..	Travelling Expenses of Band for Engagements at Netley, London, &c. ..
			Credit Balance (June 30) ..
			£203 6 10

ALDEBROTH,
August 3, 1903.

(Signed) H. A. HINGE, Captain,
Hon. Sec., R.A.M.C. Band.

R.A.M.C. COMPASSIONATE FUND.—WIDOWS AND ORPHANS' FUND.

BALANCE SHEET FOR QUARTER ENDED JUNE 30, 1903.

RECEIPTS.			EXPENDITURE.		
Date.	From whom received.	On what Account	Date.	To whom paid.	On what Account.
April 1, 1903	Balance from last Account	.. .. £546 3 7	April 1, 1903,	Disbursements to five widows	.. .. £27 5 0
June 17, 1903	Officer Commanding 18th Gen. Hospital	.. .. 405 10 9	to June 30, 1903		
April 1, 1903	Cash in hand ..	Omitted from last Account 0 1 6	May 20, 1903	Salesian Institute for Catholic Orphan Boys	.. .. 2 0 0
			April 15, 1903	J. W. Savage, South-ampton	.. .. 0 4 0
				Postage ..	.. .. 0 1 6
				Cheque Book ..	.. .. 0 5 0
				Cash in hand:—	
				Balance Credit at Bank ..	£522 0 4
				On Deposit ..	.. .. 400 0 0
					922 0 4
				Total ..	£951 15 10

ALDERSHOT,
August 8, 1903.

(Signed) H. A. HINGE, Captain,
Hon. Sec., Widows and Orphans' Fund, R.A.M.C.

R.A.M.C. COMPASSIONATE FUND.—GENERAL RELIEF FUND.

Balance Sheet for Quarter ended June 30, 1903.

Receipts.			Expenditure.		
Date.	From whom received.	On what Account.	Date.	To whom paid.	On what Account.
April 1, 1903	Balance from last Account	.. .. £177 10 10	April 1, 1903, to June 30, 1903	Small Disbursements. See book for details	Temporary Relief .. £35 10 0
" "	Cash in hand	.. Omitted from last Account	April 13, 1903	J. W. Savage	Rubber Stamp .. 0 4 0
May 21, 1903	Lt.-Col. Southey	.. Donation .. 0 2 6	" 27, 1903	Lt.-Col. E. M. Wilson	For Urgent Cases .. 5 0 0
" 27, "	Col. Trewman	.. Refund for Mr. Burn	May 21, 1903	" " "	" " " .. 5 0 0
				Postage	" " " .. 0 2 4
				Balance Credit:—	
				Cash in hand	.. £0 11 8
				At Bank ..	.. 32 16 10
				On Deposit ..	.. 100 0 0
					133 8 6
Total.. .. £179 4 10			Total.. .. £179 4 10		

ALDERSHOT,
August 3, 1903.

(Signed) H. A. HINGE, Captain,
Hon. Sec., General Relief Fund, R.A.M.C.

ANNOTATIONS.

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.—A notification in the *London Gazette* of August 14, 1903, intimates that Miss Sidney Jane Browne has been appointed Matron-in-Chief.

FAREWELL DINNER TO MISS GRAY, R.R.C.—A very interesting gathering took place on Wednesday, July 29, at St. Andrew's House, Mortimer Street, when twenty-nine members of the Queen Alexandra's Imperial Military Nursing Service, including the Matron-in-Chief, and presided over by Lady Roberts, gave a farewell dinner to Miss Gray, the senior member of the old Army Nursing Service, who has just retired after thirty years' service.

Lady Roberts, in proposing Miss Gray's health, paid a high tribute to the splendid work she had done, and said she carried with her the love and respect of all who had come in contact with her, and left behind her a bright example of devotion to duty, and sympathetic care of "the Soldiers of the King," which she (Lady Roberts) hoped the members of the new service would not be slow to follow.

In proposing the health of their Majesties the King and Queen, Lady Roberts pointed out the heavy debt of gratitude the nursing profession owes Queen Alexandra for the high esteem in which Her Majesty holds nursing work, and all she has done to uphold the honour and dignity of the nursing profession. Nothing could tend to maintain a high tone in the profession so much as what Her Majesty is now doing, namely, insisting that all who are admitted into the Queen Alexandra's Imperial Military Nursing Service must be *sans reproche* as to character, and up to the highest level of training and efficiency.

THE ROYAL MEDICAL AND CHIRURGICAL SOCIETY.—We are asked to state that this Society has by a recent regulation established a new order of its Fellowship, the members of which are to be called "Service Fellows." It is anticipated that the privileges which Fellowship of the Society affords—of contributing papers to its *Transactions*, of joining in the discussions at its meetings, in the use of its Library, and in the right of borrowing books from it—will be held by the Officers of the Services to be a material professional advantage to them.

The new regulation provides that Officers on active service becoming Fellows are only liable to pay an entrance fee of £3 3s., and an annual subscription of £1 1s., and even this subscription is remitted when they are outside the United Kingdom. Under this regulation such Service Fellows will enjoy all the privileges of Ordinary Fellows.

MILITARY MEDICAL JOURNALS.—In our reference last month to current literature of this kind we omitted to mention the *Militaerlaegen*, which is the official journal of military surgeons in Denmark. It is a flourishing quarterly which has been published regularly for eleven years. We are sorry that an oversight caused its omission from our article.

SOUTH AFRICAN FUND (R.A.M.C.)—This fund was started during the war through the efforts of a committee of ladies formed in London for the purpose of collecting contributions in money and in kind to enable comforts to be sent to the N.C.O.'s and men of the Royal Army Medical Corps in South Africa. The Fund has now been finally closed by the Committee handing over the balance remaining in the hands of the Honorary Treasurer to the Compassionate Branch of the lately organised R.A.M.C. Fund, and we are asked to publish the following letter:—

"58, Portland Place, W.

"July 24, 1903.

"DEAR SIR WILLIAM TAYLOR,—We have a balance of £109 4s. from the R.A.M.C. South Africa Fund, and I am, as Treasurer, requested to hand this over to the Compassionate Fund which has been organised for the N.C.O.'s and men of your Corps. I therefore enclose a cheque for the amount, with much pleasure, and beg you will accept this contribution for a purpose so much in accord with that for which the money was raised.

"Believe me, yours very truly,

"F. MARIE SYMONDS."

The Director-General also wishes to avail himself of this opportunity of publicly expressing, on behalf of all ranks of the Corps, his appreciation of the work done by these ladies, and his deep sense of indebtedness to H.R.H. Princess Christian and the Committee for the kindly interest in the welfare of the Corps which prompted the formation of the Fund in the first instance. He also feels sure that all ranks will join him in conveying to the Committee grateful acknowledgement of the present very handsome contribution to the Corps Compassionate Fund.

NOTICE TO SUBSCRIBERS.

THE Editor will be glad to receive original communications upon professional subjects, travel and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Lieut.-Col. O'Sullivan, Capt. J. M. Buist, Lieut. Tyndale, Major Fallon, Capt. Freeman, Major Melville, Major Winter, Major C. A. Lane, Col. Quill, Major Cummins, Major Caldwell, Capt. P. Evans, Major Wright, Capt. French, Lieut.-Col. Loughheed, Major G. Cree, Major F. Smith, Capt. Jameson, Major E. C. Freeman, Major Donegan, Major Pinches, Brig.-Surg. Tomlinson, Col. Corban, Capt. T. P. Jones.

The following periodicals have been received : *The Medical Record* of New York, *Gaz. Med. de Paris*, *Il Morqgni*, *The Medical Review*, *Militaerlaegen*, *El Siglo Medico*, *La Med. Militar. Espanola*, *Der Militärarzt*, *Annali Medicina Navale*, *Gaz. Med. Italiana*, *Deutsche Militärärztliche Zeitschrift*, *Giornale Medico del Regio Esercito*, and *The Medical News*.

Journal
of the
Royal Army Medical Corps.

Original Communications.

NOTES UPON GUNSHOT FRACTURES OF THE THIGH.

BY MAJOR N. FAICHNIE.
Royal Army Medical Corps.

HAVING served in the late South African War with a Field Hospital up to the relief of Ladysmith, and subsequently in the surgical division of a General Hospital till the close of the campaign, several cases of this class of injury in their different stages came under my notice. I propose, therefore, to submit the notes of a few cases which were under my immediate care, and to make a few remarks as to the general character and treatment of these wounds. These remarks are limited to fractures caused by small-bore bullets, such as the Lee-Metford or Mauser.

CASE No. 1.—I. Van der W. This was the case of a Dutch Colonial rebel who was shot at close range (100 yards) on May 11, 1901. He lay for twenty-four hours on the veldt, and was then brought in to our hospital in a waggon, a distance of about fifteen miles.

His state on admission, about fifty-six hours after the receipt of his injury, was as follows: On removing the rags that had been applied as dressings, the right knee-joint and thigh were found to be much swollen. The wound of entrance was small, and found to be situated on the inner side of the right knee-joint.

The aperture of exit was about the size of a shilling, and placed on the outer side of the thigh, at the junction of the lower with the middle third. The wounds were septic, and the knee-joint evidently full of pus. The head of the tibia was grooved, and the lower end of the femur split in two, the fissure extending for five inches above and reaching the knee-joint below.

The wounds of entrance and exit were enlarged. The knee-joint was also opened by an incision on each side so that the palm of the hand could be inserted. The wounds were thoroughly irrigated. Two drainage tubes were put through the knee-joint, and a third through the track of the bullet. Large gauze dressings were applied, and the limb put up in a long outside splint, and extension applied.

The subsequent course of the case was briefly as follows:—

May 21 (a week after admission).—An abscess was opened on the inner side of the thigh.

June 14.—An abscess opened in front of the thigh and some dead bone removed. (No bone was removed at the original operation.)

August 28 (about seventy-four days after admission).—More dead bone was removed. A large amount of callus had formed and the femur was united. The various sinuses still remained open. Extension was left off and the thigh kept at rest between sand-bags.

September 30.—The sinuses were scraped under chloroform.

October 14.—All wounds completely healed. The knee-joint was practically immobile. There was only half an inch shortening of the thigh. (*N.B.*—With reference to this and other measurements here recorded, it should be noted that they were all taken some time after extension had been removed. In some cases it had been found that measurements taken while extension was being employed were fallacious, owing probably to the knee-joint being stretched.)

CASE NO. 2.—This case was a Boer who was shot at close range (100 yards) on August 14, 1901. On admission on August 17 the wounds were immediately examined under chloroform, and the thigh found to be fractured about the middle. The wound of entrance was in front, about a quarter of an inch in diameter; the wound of exit immediately behind, about three-quarters of an inch in diameter.

The wounds were enlarged and all loose bone removed. This included five large pieces, the largest being three inches long, and varying from one and a half inch to half an inch in breadth. In addition, several small spicules were removed. A drainage tube was passed right through, and the wounds were well irrigated. The fracture was an oblique one, and a triangular piece of the shaft had been shattered. Gauze dressings were applied and the limb encased in cotton wool. Outside this four short splints, cut from perforated zinc, were bandaged firmly on. Extension was made from above the knee-joint, and a long outside splint applied so as to keep the limb from rolling over. For the first week the leg was dressed once a day. During this time there was a slight rise of temperature, the highest being 100·4° F. on the third day. For the second week the leg was dressed every second day, and after this every fourth day for a fortnight, by which time the wounds were quite superficial, clean, and only requiring the skin to grow over. On the sixty-fourth day after admission the thigh had so firmly united that plaster of Paris was applied, and the patient allowed upon crutches. On discharge shortly after there was half an inch of shortening. The movement at the knee was not free. This was due to the muscles catching at the anterior wound of the thigh.

CASE No. 3.—This man was a sergeant in the 39th Field Battery, and was shot at a range of about 40 yards at Tafel Kop, Orange River Colony, on December 20, 1901. Just about this time a large number of troops had been suddenly massed into the Heilbron district, and all the hospitals in the Orange River Colony were full of cases of enteric fever. Consequently this man was carried across country to Heilbron, and was then sent on by ambulance train to Norvals Pont, where he arrived on the night of December 27, seven days after he had been wounded.

On arrival he was immediately examined under chloroform. The wound of entrance was about one quarter of an inch in diameter, and situated behind and to the outer side of the right thigh. The wound of exit was about the size of half a crown, and situated on the inner and anterior surface of the thigh. On examination with the finger, the fracture was found to be an oblique one, with half the femur shattered and pulverised for about four inches. The whole of these detached bits were removed.

The wound, it should be said, was full of a greenish-coloured pus, which stank most foully. As the ends of the upper and lower fragments were denuded of periosteum, and considering the foul state of the wound, it was deemed advisable to resect the ends of the femur. These were consequently sawn off square, as much periosteum being left as possible. Thus altogether four inches of the shaft of the femur were completely removed. The wound was irrigated thoroughly and a large drainage tube inserted. Cyanide gauze dressings covered with rolls of cotton wool were then applied. Outside this were placed four perforated zinc splints. Extension was applied from above the knee, and the limb kept at rest with sand-bags. By the fourteenth day the discharge had become very much diminished, but an abscess was found in the lower half of the thigh. A drainage tube was put right through the wound again. After this the discharge quickly diminished, and on the fifty-fifth day after admission the wound had completely healed, and remained so over a year afterwards, when the last news was received from this patient. At this time there was a good deal of œdema of the limb, and the knee-joint was much swollen. On examining the seat of fracture a considerable amount of callus had formed, so that the shaft felt continuous and no gap could be made out; but it was some time before the callus became completely hard, so that no movement could be obtained at the seat of fracture. For the next three months the callus gradually became harder, and at the end of that time the patient could lift the thigh of his own accord. The thigh was several times measured, and there was found to be one inch shortening of the right thigh and right lower limb. The measurements were taken from the anterior superior iliac spine to the tubercle of the tibia and the tip of the internal malleolus respectively.

On September 24, 1902, the officer in charge of the Surgical Division at Netley reported that the patient could walk about with the help of a stick.

On February 12, 1903, the patient wrote and stated that he could walk quite well with the help of a boot, but that when he had started walking the thigh had become bent out, so that the shortening had increased to two and a half inches, when he left Netley in October, 1901.

CASE NO. 4.—Trooper G., Imperial Yeomanry. This man was wounded at Tafel Kop, Orange River Colony, on December 20,

1901, at the same time as Sergeant C. (Case 3), and was brought to Norvals Pont on the same day, December 27, 1901. He was also shot at very close range (about 40 yards). On arrival the general health of this patient was very bad; the pulse was quick and weak, the tongue furred and dry, coupled with sordes on the teeth, all the result of septic fever. The wound of entrance was small, about one quarter of an inch in diameter, and situated on the outer side of the right thigh immediately below the great trochanter. The wound of exit was about three-fourths of an inch in diameter, and situated opposite that of entrance at a point some two inches from the anus. In addition, the upper third of the femur was shattered for about two inches of its continuity. Under chloroform the wound of entrance was enlarged, and as quickly as possible the detached bits of bone removed, the two largest pieces measuring one and a half inch by half an inch. The wound was irrigated, and a large rubber drain passed through. The aperture of exit, being so near the anus, was thoroughly cleaned. Cyanide gauze dressings, rolls of cotton wool, and short perforated zinc splints were applied, with extension made from above the knee. The wound was dressed daily, the patient having diarrhœa, adding to the difficulties of keeping the wound clean.

Three weeks after admission the general health had much improved, and the discharge much diminished; but it was noticed that there was more from the wound of entrance than from that of exit. On probing, some loose bone could be felt; accordingly chloroform was given again, and a piece one inch by half an inch was removed. The sharp end of the upper fragment of the femur was also nipped off with the forceps. There had been some attempt at union, but by the end of the operation the thigh was like a flail again. From this time the case progressed very favourably.

On February 20 (fifty-five days after admission and thirty-six days after the operation) extension was left off as union was complete. A large amount of callus had formed, and the patient could lift his thigh quite easily of his own accord. The tissues, however, had not healed. These were scraped with a sharp spoon. A week later they had quite healed, and the patient was allowed up on crutches.

On March 13, 1902, there was three-fourths of an inch shortening. When heard from in September, 1902, the patient stated

that except for occasional pain in cold weather he was as sound as ever he was.

CASE NO. 5.—Boer prisoner, J. S. This man was under my care for only a few weeks, and then some thirteen months after he had been wounded. The history of the case was as follows: On August 8, 1901, he was wounded near Brandfort, the thigh being fractured about its middle. The limb was put up in splints, no attempt being made to remove any detached bits of bone. In January, 1902, the wound had not healed, operation being performed to remove dead bone. In October, 1902, when the patient came under my care, four operations had been performed to remove dead bone, one quite recently. The wound had not healed. The sinus was several times scraped with a sharp spoon, but had not healed up to the date of my last seeing the man. His subsequent history I have not been able to trace.

In the light of my experiences of these cases the two most important points in determining the character of gunshot fractures of the femur appear to be (1) the range; (2) the angle at which the bone was struck.

The femur being a very hard bone, the substance is usually only perforated at the lower end or through the hip-joint. With regard to the range, the shorter this is the more severe is the injury to the bone, *i.e.*, there is greater comminution and pulverisation.

The amount of fissuring in the femur depends on the angle at which the bullet strikes the bone. Thus in the cases recorded here the longest fissure was produced in case No. 1, in which the bullet took a longitudinal direction along the shaft. Some index of the severity of the bone lesion is given by the difference between the wounds of entrance and exit, the larger the wound of exit the more severe the bone injury. Most fractures of the femur were oblique in character and a triangular patch of bone was detached from the shaft. This might consist of one piece of bone, but generally it was broken up into several large pieces and also a mass of small spicules, some of which were often driven into the neighbouring muscular tissue. Sometimes the larger pieces were denuded of their periosteum.

A great characteristic of gunshot fractures is the circumscribed area of bone, muscle and periosteum destroyed or injured, in comparison with the extensive areas of these tissues often destroyed

in the compound fractures of civil hospitals. This comparison was well brought out at Norvals Pont while some of the above cases were in hospital, when two cases of compound fracture were brought in, the result of a severe railway accident in the neighbourhood. In both of these latter cases attempts were made to save the limbs; but on examination under chloroform a fortnight after admission, such large portions of bone were found denuded of periosteum that further attempts to save the limbs were palpably useless and amputation was performed. In each of these cases a considerable portion of the limb was crushed and devitalised by the accident, the injury not being circumscribed, as in the wounds from gunshot.

The treatment of gunshot fractures of the thigh has altered very considerably during the last fifty years. Previous to the year 1850 primary amputation was recommended in all cases of fracture of the thigh, as the mortality after amputation (45 to 80 per cent.) was more favourable than after excision (66 to 84 per cent.), and apparently conservative treatment was not attempted at all. In the American War conservation was first tried, the mortality with this line of treatment being for the upper third of the thigh 46·0 per cent., for the middle third 40·6 per cent., and for the lower third of thigh 38·2 per cent.

Of 6,576 cases of gunshot fractures of the thigh recorded during the American War, the following were ratios of mortality: Upper third 49·7 per cent., middle third 46·1 per cent., and lower third 42·8 per cent. These included all fractures of severity. The best results were obtained from conservative treatment. Secondary amputations gave better results than primary amputations, and both better results than excisions.

Thanks to the teaching of Lister, the mortality of gunshot fractures of the thigh has undoubtedly very much diminished. From the experience of the Tirah Expedition and the South African War, amputation or excisions for these injuries, when produced by small calibre bullets, should seldom be required, and the one treatment is the conservative one, the only exception to this being the occurrence of traumatic gangrene.

In military practice, in time of war, treatment must often depend on circumstances. The less a case of fracture is moved the better the chance of a favourable result; but very often this rule has to be disregarded. All that can be done in a

Field Hospital, before transferring a case, is to thoroughly clean and carefully dress the wound, apply splints, and give morphia. If thorough antiseptic precautions be taken when the wound is first dressed, and also if the wound is watched during transfer so that dressings are changed at the earliest sign of discharges coming through, the case will arrive at the stationary hospital with a clean wound, and the after treatment be much simplified.

On arrival at a fixed or permanent hospital the question arises whether the wound should be simply dressed or whether it should be explored. I think myself that every case of gunshot fracture of the thigh should be explored under an anæsthetic. If on exploring and slightly enlarging the wound no detached bits of bone are found, the wound can be dressed, and little if any harm has been done. If, on the other hand, the wound is not explored, and bits of bone are left behind, they may give rise to trouble. Firstly, they may delay the healing of the wound, and have to be removed after a few weeks, or give rise to troublesome sinuses. Again, they may be inert for a time, and then even months after give rise to abscesses. With spicules of bone embedded in muscle this would be a comparatively simple matter; but when bits of bone give rise to abscesses after callus has been thrown round them the matter becomes far more serious and difficult to treat. Intractable sinuses may form, and repeated operations be required for removal of sequestra. Thus in Case 5 the man had been wounded thirteen months before he came under my care. Although four operations for sequestrotomy had been performed, he was far from well when he was transferred from my charge on my leaving South Africa. Numerous similar cases occurred both after the Tirah Expedition and after the South African War.

If, on exploration, the shaft is found to be comminuted, all loose spicules and detached bits of bone should be removed. A loose piece of bone whose attachment with periosteum is doubtful should, I think, be removed; but if the periosteum is uninjured and complete it may be left behind. In removing bits of bone with only a partial attachment of periosteum, as much periosteum as possible should be left behind when the bone is removed. Even in very severe fractures only about one-third of a portion of the shaft becomes comminuted. In

Cases 2 and 4, although the whole of the comminuted bone was removed, union occurred in two months.

Sometimes the upper and lower fragments of the shaft are quite denuded of periosteum at their jagged ends. In these cases a little piece snipped off with bone forceps saves trouble later on from necrosis. It was done in the Case No. 4, and union occurred in less than two months. The extensive resection that was performed in the case of Sergeant C. (Case 3) was only undertaken on account of the septic nature of the case, and owing to the fragment being rough and denuded of periosteum. Whether the treatment was right or not, this case is a most interesting one, as in it a gap caused by four inches of femur being completely removed was completely filled up with new bone strong enough to support the weight of the body. Such a resection would seldom, if ever, be justifiable; still the case shows that with an ordinary fracture, in which a triangular piece consisting of one-third of a portion of the shaft of the femur is destroyed, all loose bone, likely to necrose, may with safety be removed.

The use of drainage tubes requires some judgment. In all cases I think they are necessary for at least the first twelve or twenty-four hours. After that time their use depends on the septic character or otherwise of the wound. The sooner they can be shortened and removed altogether the better, as continuous usage makes intractable sinuses. Pieces of bone left behind very often cause irritation, and make the use of tubes necessary for a considerable time. Once the cause of irritation was removed, I found scraping with a Volkmann's spoon and allowing the surfaces of the sinuses to come together very useful. In this way old sinuses were sometimes made to heal in less than a week.

Cyanide gauze dressings steeped in 1 in 1,000 perchloride of mercury makes a good dressing in the early stages. Later, when discharge has almost ceased, and the wounds simply require to granulate over, plain gauze (boiled) or plain lint (boiled) should be substituted.

Various kinds of splints were tried, but latterly I dressed all cases of fractures—including two of simple fracture—in the following manner: To begin with, strapping and bandages are applied to the limb for the purposes of extension. The limb is

then raised by an assistant, and a steady extension applied from the knee, and, if necessary, counter extension maintained from the hip till the fragments are in good position. Whilst in this position the dressings are applied, and rolls of anti-septic wool firmly wrapped round and round so as to apply a steady even pressure. Over the wool short splints made of perforated zinc sheeting are placed, and the whole firmly bandaged. The limb is then put down and the extension is fixed. In addition, a long outside splint can be applied to keep the limb from rolling over, or simply a few sand-bags. To redress the case, the limb should be raised and steady extension applied before the splints are removed. In cases of fracture of the upper third of the femur the limb should be raised to at least an angle of 45° before the splints are removed.

The advantages of this method are that (1) the fragments are kept from sagging by the pressure of the cotton-wool; (2) dressings can be changed almost painlessly and with very little disturbance of the fragments, especially after the first week, when granulations have been freely thrown out and help to keep the fragments in position. When sand-bags have been used instead of a long splint, after a time the patient may be allowed to use a back-rest instead of continually lying on his back.

Effusion into the knee-joint is a common symptom in gunshot fractures of the thigh. Even pressure applied by means of cotton wool and a bandage will generally be sufficient to remove this.

The judicious use of massage and passive movements while the splints are still on helps very often to keep the joints from becoming stiff. In most cases massage is required after the splints are taken off to restore muscular tone and to break muscular adhesions at the seat of fracture.

Delay in healing of wounds must be treated according to the cause. Drainage tubes used for a long period and necrosis of bone are two common causes of this retardation.

FOUR CASES OF GUNSHOT INJURY TO THE SPINAL COLUMN.

By G. L. CHEATLE, C.B., F.R.C.S.

*Late a Consulting Surgeon to H.M. Forces in South Africa.
Surgeon to King's College Hospital, London.*

THE difficulty of carrying out *post-mortem* examinations whilst on active service, when thorough means of investigation are not always available, must account for any shortcomings in the records of these cases, which appear to me to present many points of interest. The cases may be arranged under two heads, namely, those (Cases 1 and 2) in which the spinal cord is destroyed at the seat of injury, and those (Cases 3 and 4) in which no obvious damage has been inflicted upon the cord and its membranes. Notwithstanding the difference in the nature of the lesions, the main clinical signs and symptoms were identical, viz., those of profound concussion.

In each of the four cases there was complete paralysis and anaesthesia below the parts struck, while also the superficial and deep reflexes and ankle clonus could not be elicited. There was loss of control over the rectum, and septic purulent urine was passed incontinently and unconsciously from an over-distended bladder. Each case had a large and septic bed sore, which extended to the underlying bony parts. There was a typical hectic condition, and in each case the main cause of death was infection of the genito-urinary apparatus and of the bed sore. No case showed any signs indicating recovery of function.

The points peculiar to each case were as follows :—

CASE 1.—This man was shot at a range of about 800 yards. The Mauser bullet entered the spinal column hind end foremost, in which position it became impacted in the 11th dorsal vertebra. The spinal cord was destroyed at this segment (fig. 1). The patient died twelve days after admission to hospital, or sixteen days after the receipt of his wound.

CASE 2.—For the notes and specimens of this case I am indebted to my friend Surg.-Lieut.-Col. Crooke-Lawless, of the Coldstream Guards. This patient had a bed sore on each gluteal region, said to have been caused by his comrades attempting to drag him away on his back after he was wounded. As he was a fine specimen of

a Boer, 6 feet 8 inches in height, and fully developed in proportion, the traumatism may have had a great deal to do with the sites of their occurrence. During the progress of the case the penis remained in a state of semi-erection, and on one occasion there was profuse bleeding from a deep artery in the gluteal region, which ligation arrested. The man died twenty-four days after he was hit, and at the autopsy it was found that a Lee-Enfield bullet had entered the vertebral column by the side of the spinous process of the 5th dorsal vertebra and become loosely lodged in the vertebral canal at the level of the 6th dorsal vertebra (fig. 2). The membranes were found perforated and the cord destroyed at this segment.

CASE 3.—In this man a Martini-Henry bullet struck the 10th dorsal vertebra and its leaden particles became embedded in that bone. The cancellous spaces of this vertebra were abnormally large, but the holes seen in fig. 3, which represents this case, were mainly caused in searching for fragments of the bullet. The drawing would lead the observer to infer that the bone pressed upon the cord, an inference not possible when looking at the original specimen. The vertebral canal was not entered by the bullet. The patient died eighteen days after being wounded.

CASE 4.—This man was shot at a very short range, probably not more than ten yards. The Martini-Henry bullet having smashed through the 7th rib, hit the 7th dorsal vertebra, in which its leaden particles became imbedded, the spinal cord and meninges were untouched (fig. 4). The patient lived seventeen days after being shot.

It is important to observe that the bullets in Case 1 (a Mauser) and in Case 2 (a Lee-Enfield) had actually penetrated the vertebral canals and meninges, and had completely destroyed the spinal cords at the parts struck. In Cases 3 and 4, on the other hand, the Martini-Henry bullets, after striking the vertebral columns and doing local damage to them and neighbouring structures, had broken up into leaden fragments and particles, varying in size from half an inch to pieces which could be just discerned by the aid of a lens, and had become imbedded in different parts of the vertebræ. No penetration of the vertebral canals had occurred, and apparently no damage had been done to the spinal cords and membranes which could possibly account for the serious nature of the clinical signs.

These facts rendered the microscopical examination of the

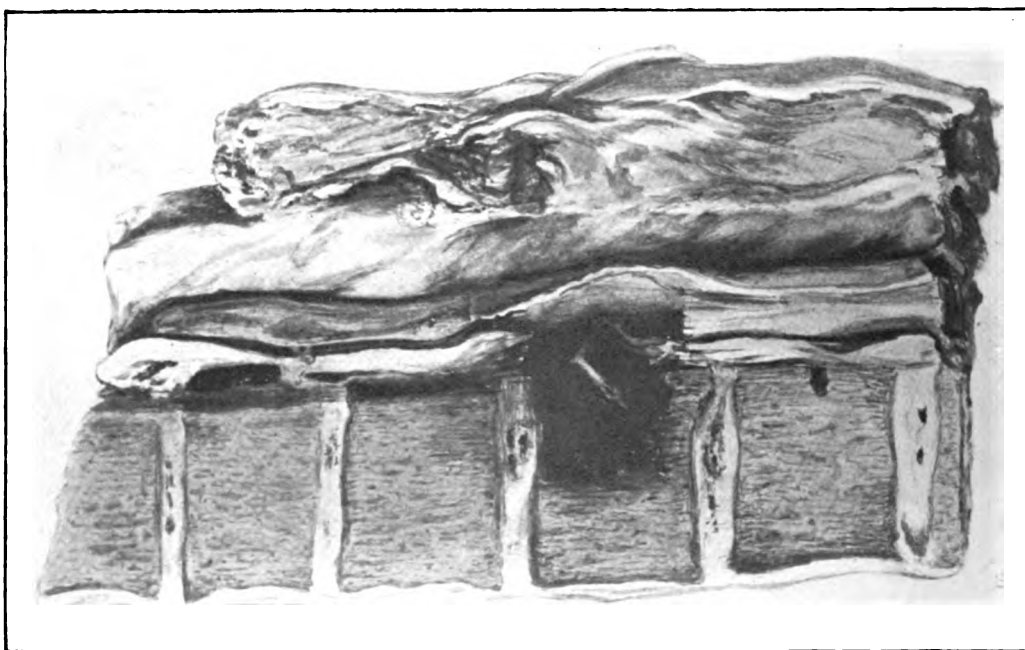


FIG. 1.

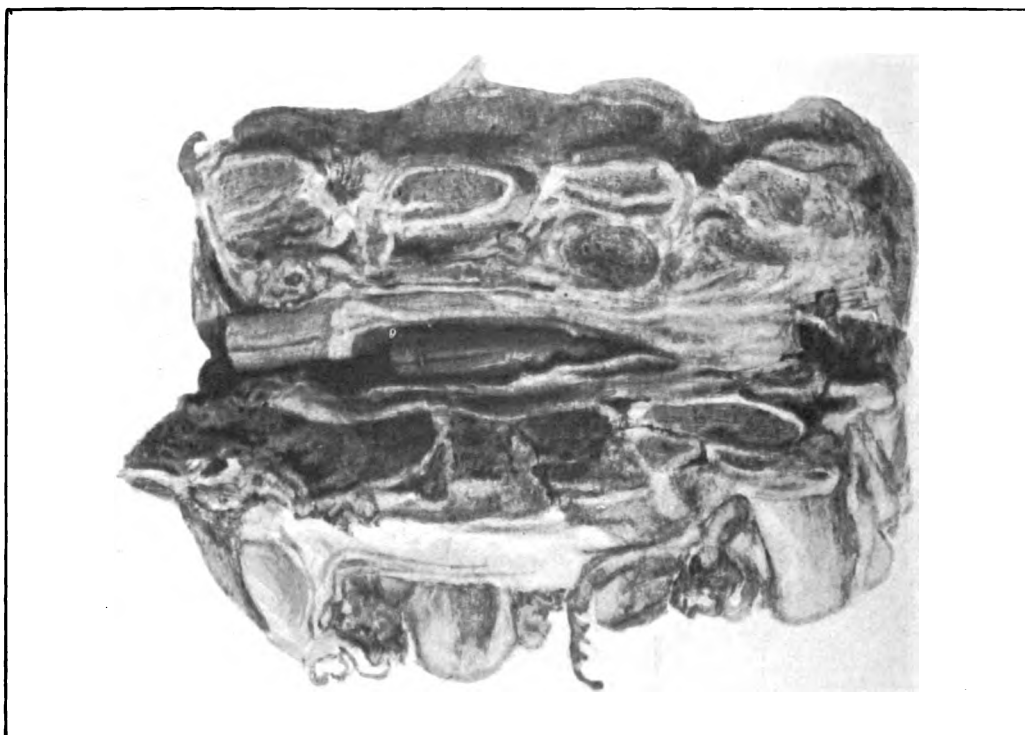


FIG. 2.

Illustrating Mr. CHEATLE'S Paper.

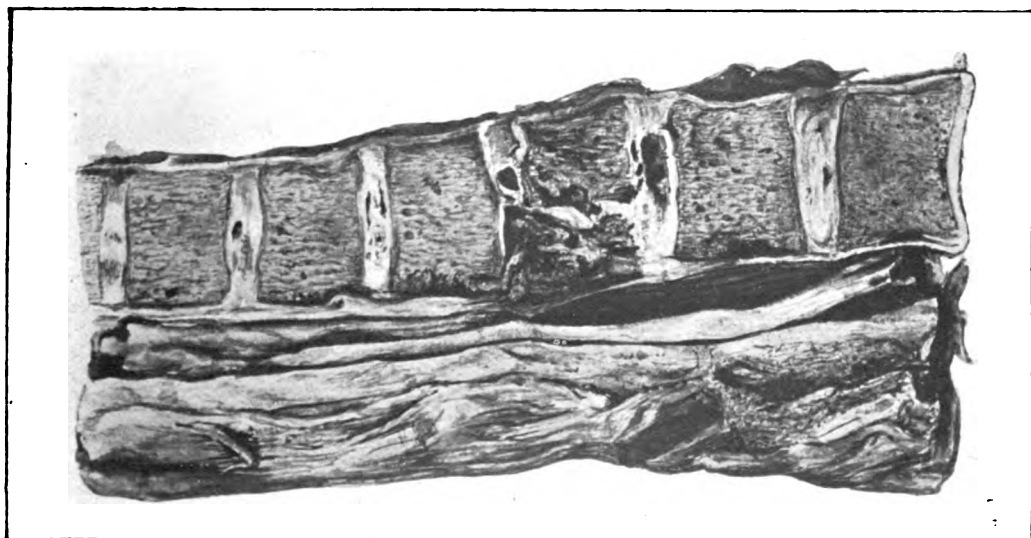


FIG. 3.

Illustrating Mr. CHEATLE'S Paper.

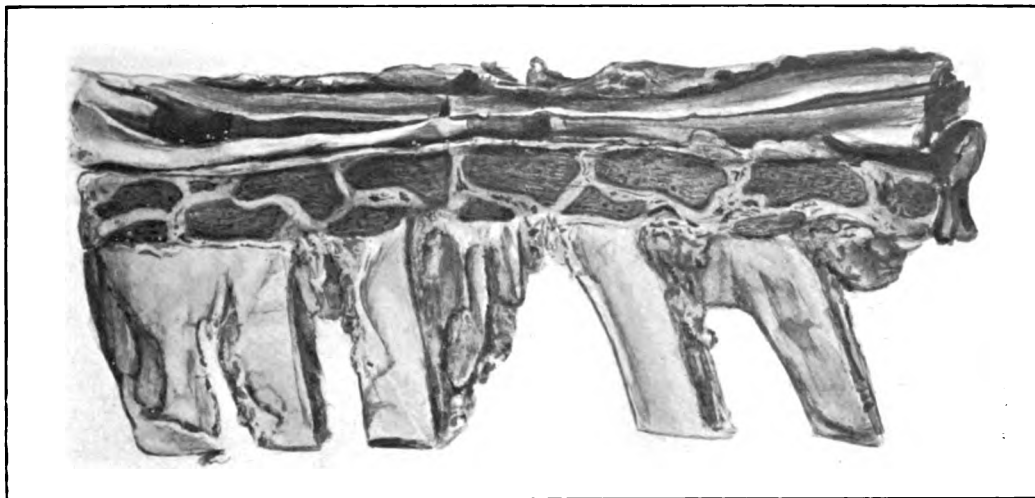


FIG. 4.



spinal cords in Cases 3 and 4 of the utmost importance, and I brought them safely home for that purpose. As the cords of these two cases showed practically the same features, I will describe the cord of Case 3. At that part of the cord which corresponded with and was opposite to the vertebra which was actually struck, there could be seen profound changes within the ganglion cells situated in the anterior and posterior horns of the grey matter. The intracellular changes were as follows: In some the Nissl bodies were absent, and in others the amount of chromatolysis was marked in a more or less degree. The ganglion cells in question showed excentric nuclei, and in some cells these nuclei were quite at the periphery. The intracellular degeneration became less the farther away from the injury one examined; thus, marked differences were observed two segments higher. It must be noted that there was no engorgement of blood-vessels, and the spinal cords and their meninges did not show emigration of any leucocytes nor any sign of hæmorrhage other than a slight staining in the extradural space opposite the part actually hit. Müller's fluid was not available, hence tracts of degeneration, if they existed, could not be followed. As the cords in the close vicinity of the impacted bullets in Cases 1 and 2 showed none of the intracellular degenerations, it must be assumed that the effects from the cord of the Martini-Henry bullet are more diffuse than those of an encased small-bore bullet.

The real meaning of the changes here found in the ganglion cells, or how they are brought about, is not easy to definitely state. Similar changes are found in animals as a result of fatigue (Lugaro). Lugaro and others have shown that irritation of peripheral nerves may also cause intracellular degeneration. Drugs, such as arsenic and bromide of potassium, may do the same. Circulating toxins of micro-organisms might have induced the changes in my cases, but on the whole they seem to me to have been due to the injury of the spinal column, because the intracellular degenerations in the spinal cords are most marked opposite the point struck, and are then seen to rapidly lessen from that point.

The lesion, if any, which induces shock or concussion is not exactly known, but there appears to be a growing belief that the symptoms of shock or concussion of the spinal cord such as displayed by Cases 3 and 4 are accompanied by and probably caused by minute intracellular changes. The spinal cord changes in Cases 3 and 4 are pieces of evidence in favour of this belief. On the other

hand, it must be observed that a heavy blow will not always induce shock, whilst a comparatively slight one sometimes will. One would have imagined that intracellular changes which are sometimes capable of being induced by a slight blow would be at least more frequently induced by a heavy one.

Now with regard to treatment, so far as these cases can lead us, they demonstrate that complete paraplegia and anæsthesia, the absence of superficial and deep reflexes and ankle clonus, loss of control over the rectum and incontinence of urine, due to an over distended bladder, are, broadly speaking, contra-indications for laminectomy. Each of the four cases had the symptoms which are associated with profound shock of the spinal cord, and we have seen that in Cases 1 and 2 the spinal cord was so smashed that the removal of the bullets would not have relieved a single symptom. Moreover, the bullet in Case 1 is seen to be inaccessible, and could not have been reached by laminectomy.

With regard to Cases 3 and 4, I believe they would have recovered had it not been for the toxic products of micro-organisms, which were poisoning them from the genito-urinary systems, and bedsores, a belief founded on experimental injuries to the spinal columns of animals and clinical observation upon other cases. I have seen three cases get well suffering from the same class of symptoms, viz., profound shock to the spinal cord. One of the three cases so completely recovered that he went back to the front, and I am glad to say went safely through the rest of the war. The recovery in the other cases has been slow, but still definite. Under any circumstances, Cases 3 and 4 would have received no benefit from laminectomy.

Although it can be definitely stated that laminectomy is generally contra-indicated in cases suffering from the shock symptoms, still one can imagine the possibility of X-ray pictures accurately locating a bullet within the vertebral canal, and so demonstrating its accessibility that the question of its removal might arise. For example, Case 2 shows a bullet the subsequent removal of which might have been necessary, because it is not impacted in bone, and its movements might have caused signs indicating irritation of the spinal cord. And one can further imagine an X-ray photograph demonstrating a piece of depressed bone upon the cord as causing so great a pressure that the signs of compression would be the same as those of profound concus-

sion. A severe hæmorrhage might conceivably be doing the same thing, but in my experience these were uncommon results of bullet injuries.

On the other hand, laminectomy and early laminectomy is indicated in cases which exhibit symptoms of excitability and irritability of the spinal cord, both when they exist alone or when they are associated with the symptoms of shock. Such indicative symptoms would be involuntary movements of limbs, spasmodic contraction of muscles and definite shooting or lancinating pains along definite nerve roots, and hyperæsthesia, exaggerated reflexes, and so forth.

Can anything be done for cases in which laminectomy is inadvisable? Most certainly, and the patients' lives will depend upon the efficiency with which the treatment is practised. The treatment of such cases can be summed up in two words. Prevent infection. The main points, I believe, are to keep the bladder aseptic, and guard against the formation of bedsores. Rest, quietness, and constant general attention are all important, but when once the bladder is infected and deep septic bedsores exist, rest and quietness are not of much avail. Cases similar to 3 and 4 have undoubtedly partially or completely recovered even when sepsis has supervened, but its presence is a grave symptom full of evil consequences. I feel sure it is much sounder practice to leave a bladder full than to empty it by means of an instrument the purity of which is uncertain.

Bullet wound injuries to the spinal column accompanied by symptoms of profound shock, and by the constant and unconscious passage of infected urine; large, deep, spreading and infected bedsores constantly bathed in loose and uncontrolled evacuations of the rectum; form the most trying, pitiful and difficult cases to treat in military surgery, and tax to straining point the health and hopefulness of all who attend them. Such a case is a nurse's battle. Bedsores must be kept not only free from pressure, but also free from pollution by urine and motions. The bladder should be kept empty by drawing off the urine at regular times, and in my cases I kept the penis in a suitable vessel so that it was impossible for the man to soil himself and his bed in the event of the uncontrolled escape of urine between the passing of the catheter.

The fæcal discharges are difficult to control, and yet it is

essential they should be kept from the bedsores. With this object in view I performed colotomy in two cases; one wound which was made in the anæsthetic area failed to organise, and the operation failed. But in another case colotomy was performed above the anæsthetic area and was perfectly successful, the motions were easily and with certainty kept from the bed sore, and when the case died it was healing and quite sweet. This case completely proved that colotomy is a valuable operation even in a patient so seriously injured.

The prognosis with regard to life of such cases as the above depends upon the seat of injury, the cause of the symptoms and the treatment meted out to them. The prognosis with regard to life is a hopeful one, when the wound is too low to cause interference with the muscles of respiration, where no bullet can be located in the vertebral canal, and where no infective processes are in operation. The prognosis is not so hopeful when the bullet can be shown by means of X-ray photography to be in the vertebral canal—I admit a most difficult process, because the cord will probably be destroyed. And, when the cases are accompanied by infective processes and severe bedsores, the prognosis is always grave.

The prognosis with regard to recovery of function if the patient lives, depends almost entirely upon the nature of the injury to the spinal cord, that is to say, whether it has caused shock or whether it has destroyed a segment. In the spinal cord, so far as we now know, no nervous connections are re-established between the peripheral and central parts of the destroyed ends. When the X-rays cannot definitely demonstrate a source of pressure such as a dislocated piece of bone or a bullet within the vertebral canal, then the prognosis of recovery is more hopeful. But a hopeful issue must be given very guardedly, because there are cases in which the cords may be destroyed altogether although no bullets have entered the vertebral canal, and a bullet in passing in and out of the body might in its transit destroy the spinal cord, and yet leave no trace discoverable by the X-rays, and a large hæmorrhage would escape detection by the same means. The position of the wounds of entrance and exit may afford some clue as to the possibility of the bullet's transit through the vertebral canal, but no great trust can be placed in the observation, because many a case has recovered in which the position of these wounds led one to infer that the cord itself had been destroyed.

CORDITE-EATING AND CORDITE-EATERS.

BY MAJOR J. W. JENNINGS, D.S.O.

Royal Army Medical Corps.

JUST before joining Colville's column, and while I was in medical charge of troops at Paardekop, during the recent operations in South Africa, it was suggested to me by a regimental non-commissioned officer that some men were supposed to have taken cordite in order to produce palpitation and get themselves invalided home. Curious to find out if there was any truth in this assertion, I at once began investigations, and although I myself never met with a case in which a man resorted deliberately to this device for inducing a disability so as to escape service, I elicited some singular facts in respect of cordite-eating and its effects generally, and came across at least one peculiar individual whose experiences may be of some interest.

The following particulars comprise nearly all the facts that I was able to collect or observe, and I give them just as they were given to me. This way of retailing them, though adequately explicit, may help to atone for the obviously disconnected and fragmentary style in which these notes have been jotted down. I have endeavoured to emphasise the distinction between things said and things seen, and I may here observe that the man, Trooper R., whose confessions are set forth at length, is, or has been, a dipsomaniac, morphinomaniac, opium smoker, and cocaine as well as opium eater.

Such men are proverbially mendacious, but this man's comrades and three of his officers all testified to the truth of his statements, so far as they referred to the time he was serving with them. I have, personally, seen him eat at one time three strands, and at another time six strands of cordite out of a Lee-Metford cartridge, with little or no effects other than a slightly accelerated pulse and an exaggerated strabismus (he had naturally a slight squint). He may have been fortified with opium beforehand, but this is mere conjecture. This man was of the lower middle class, and was not only generally well informed, but remarkably shrewd, interesting and entertaining. He had a first-rate memory, was an expert hair-cutter and an excellent cook, which I can aver

from practical experience of his accomplishments. His physical development was above the average, he was 35 years of age, partly bald, of a fair complexion, with pale blue and very slightly squinting eyes, but his physiognomy suggested a Jewish type.

In his description of his own case which follows, many of the symptoms must be ascribed to opium. Cordite, when taken in "strand" form, rapidly produces a violent splitting headache in the temporal and occipital regions, the headache continuing all day. As an experiment, I tried one-fourth of a strand from a Lee-Metford cartridge, which I kept in my mouth and sucked for two minutes. I then took it out. Its diminution in size was scarcely appreciable, and yet I experienced the most racking, splitting headache that I ever felt in my life, together with hammering and ringing noises in my ears; the headache lasted quite thirty-six hours.

Cordite has a sweet, pleasant, pungent taste, and is only slightly soluble in the mouth. Its physiological action is similar to, but slower than, amyl nitrite, viz., throbbing headache, flushing of the face, visible carotid pulsation, giddiness and disordered action of the heart, &c. Roughly, its percentage composition may be said to be nitro-glycerine 58 parts, gun-cotton 37 parts, and mineral jelly 5 parts. Acetone is used as the solvent, but does not enter largely into its composition. The thick pasty mass is then forced through a die under heavy pressure. Each Lee-Metford cartridge contains sixty cylindrical strands of cordite, and each strand measures one and a quarter inches in length and one-twenty-fifth of an inch in thickness.

The following train of symptoms are commonly presented by a man who has eaten cordite:—

The conjunctivæ become of a yellowish tinge and the eyes assume a glazed appearance, giving to the face a wild expression. The features are drawn. The skin of the body presents a dirty yellowish or brownish, or sallow tint. Constipation and occasional slight fever prevails, periodical or almost constant headaches, loss of appetite, marked thirst, dulling of mental faculties and great desire to sleep. When taken in stick form (four to ten or more strands), cordite rapidly produces a violent splitting headache in the temporal and occipital regions, the headache continuing all day. It has a sweet pungent taste and is scarcely soluble in the mouth, or only so after prolonged mastication.

When taken with beer or tea (five to ten strands), cordite appears to produce heavy sleep, followed by a stupor lasting approximately five to twelve hours. The larger the quantity taken the longer the sleep. It is difficult to awaken the subject, it being often necessary to slap his face, punch or shake him, and he is with difficulty persuaded to rise. The awakening is accompanied by a severe dull boring headache, slight facial muscular twitchings and protrusion of the eyes, which latter are dull and "heavy." When fully awake the cordite-eater does not seem to realise his surroundings. The brain is slow to receive impressions, it being usually necessary to repeat a question two or three times before it is understood. There is a marked disinclination for food, coupled with a tendency to vomit. In the patient under observation (Trooper R.), a man addicted to the use of cocaine, opium, morphia and alcohol, a great craving for beer was evinced. A pint of this beverage usually restored him to his senses. In other cases, and at times in this man, beer produces an exhilarating effect which lasts as long as the subject is kept busy moving about, the reaction setting in immediately he is unemployed. In the latter case (Trooper R.'s), the patient expressed a desire to sleep, became angry if opposed, and, if required or asked to do anything obstinately but politely refused. Towards his comrades he sometimes showed sullenness and combativeness. If allowed to sleep for two or three hours, the effects rapidly pass off, and the man appears to be all right, but some traces of pain linger in the head and an unquenchable thirst exists, and sometimes a slight feverishness is observed. The above subject expressed a great longing for juicy fruits, and ate as many as eight oranges in as many minutes.

Taken in solution, as with tea, cordite appears to produce an almost immediate exhilarating effect, inciting to almost demoniacal actions. If many have partaken of the beverage all begin talking at once, seemingly anxious to inform each other of everything that happened to them since their birth. This condition lasts perhaps two or three hours, when the effect seems to die away and sleep overcomes them, or if there should be an unexpected cessation of the excitement (as upon being reprimanded for making such a noise) they all seem to be overcome by a stern sense of discipline, roll over and go to sleep.

If beer is in addition consumed during the excited state it

incites a quarrelsome and destructive mania towards the best of friends, even in an otherwise peaceably disposed individual. If the cordite is mixed up with beer and consumed as an ordinary drink, a glassful will produce seeming intoxication in a man who could normally consume perhaps as much as four to six pints without exhibiting a trace of having done so, and if it does not overpower him and produce sleep it makes him not only quarrelsome, but brings out all the worst traits in his character.

As illustrating the extraordinary effects produced by cordite, the following facts either came under my notice or were furnished to me by others.

(1) The victim was acting as a caterer of the non-commissioned officers' mess of an irregular cavalry corps, and having had some trouble with the native assistants, he had no food ready when supper time arrived. Nevertheless, he rang the supper bell. The men came and took their seats before an empty table, whereupon the caterer then made his appearance, and told them, with the utmost gravity, that there was a nice large roast on the table and everything else which constituted a good supper, adding, "I know you can't see, but I can, so dig in." The non-commissioned officers made their supper off some tinned food, which the canteen sergeant provided, and the caterer slept the sleep of cordite.

(2) A dozen or more men having taken their usual dose of beer and cordite, were all talking and shouting at once, when one of them, having managed to make himself heard above the din, proposed a war dance. It was a still, though bitterly cold night, and the men were in their underclothing. In spite of this, they took their candles outside their tents, placed them upon the ground, and proceeded to execute a series of antics, which clearly indicated them to be under the influence of some drug. No amount of persuasion on the part of the non-commissioned officers or anyone else had any effect on them. They kept it up for twenty minutes or half an hour until, becoming played out, they sank exhausted on the ground.

(3) The following statement of Trooper R. was made to me when he was in hospital at Paardekop :—

"I first commenced the use of cordite in the middle of March, present year (1900), and have used it occasionally up to date. When eating it I usually take thirty or forty sticks, chew them, then take a mouthful of water, which causes it to crumble more

readily in my mouth, and prevents it from 'gumming.' In about ten minutes a very drowsy feeling comes over me, and in about fifteen minutes it produces a deep sleep lasting some six hours. I awake with a painful splitting headache and a great craving for some stimulant. If I drink a few ounces of spirit, or a few pints of beer, it seems to partially restore me. I have to continue drinking beer in small quantities until noon-time, consuming about four or five pints altogether, by which time I feel all right. While recovering from the effects of cordite, if I were to drink a quantity of beer at one time it would make me helplessly drunk, so I use it sparingly when getting over a dose of cordite. Morphia and cocaine also straighten me up, but not completely. I have to take some beer to make it complete. I have been in the habit of using both opium (smoking it) and morphia (hypodermically), but not for fully a year and a half. If I eat cordite during the day, a few sticks every once in a while, it befogs my faculties, causing me to do the same thing three or four times. I become very absent-minded and irritable, but as long as I keep on my feet I do not feel sleepy. If I drink any beer in this state it produces almost immediate intoxication and makes me behave very foolishly.

"About three cartridges added to half a pint of water or tea boiled down to about a gill, when it is of the consistency of thick molasses or glycerine, and sipped occasionally, makes one feel like a prince. Taken in this form, cordite makes me want to tell all my troubles and all I know to any listener. It gradually produces sleep, the awakening being accompanied by the usual headache, but the feeling is not quite so bad as I would have felt had I drunk beer with it.

"If beer, say a few pints, is drunk in conjunction with the above solution, it very shortly makes me as mad as a man can get without becoming absolutely a raving lunatic. It was while in this condition that I went over to the station-master at Platrand, four miles away, dressed in my underclothes and a blanket, and without boots at midnight, woke him up, and told him if he would give me a bed for the night I would work his telegraph instruments for him all day long. I am not fully cognisant of what I do while in this state, but generally find out about it next day, sometimes to my great surprise, as it seems hard to believe some of the antics which I am told I have performed; but the

knowledge of them does not worry me next day, as I feel too bad. Cordite, no matter how taken or in what form, always gives me the most terrible nightmares, in fact, everything seems to be in a chaotic state. As long as a man has cordite in his system he is more or less insane, although he may appear sane enough. My eyes feel as if they were jumping from their sockets, and objects have a dim appearance as long as the headache lasts."

(4) Lance-Corporal F., 1st Essex Regiment, gave me the following details : "Whilst on the Gras Pan march, I noticed other men chewing their cordite. I tried some myself, chewing two pieces, which gave me an awful headache. It strikes the head at the temples, and strikes right through to the back of the head, Then it keeps thumping for hours. Being short of matches we used cordite to light our pipes and cigarettes with, which made our throats very dry, and made it very hard to swallow spittle, or water, or anything. After continuing this we found it made us very weak, and when on night duty I could see different objects, which seemed to rise up in front of me, and which caused me to feel startled and to start challenging, and to shake and tremble with fear ; but I would then turn my head aside for a minute sometimes, and when I looked again I could not see anything. During this time my head would seem to be swimming, eyes grow dim, and I would feel awfully weary and want to lie down. It made one feel sick. I am a total abstainer."

(5) Private W., 1st Essex Regiment, made the following statement : "Having noticed other men use the sticks of cordite to light their pipes and cigarettes, I did the same, and noticed that after the first two or three cigarettes it gave me a headache, and if I lighted and smoked four or five it would make me dizzy and feel as if I wanted to clutch at a pole or something to support myself. It makes me feel terribly uneasy and I want to sit down, and a general uneasy feeling comes over me. At night time it makes me fancy I can see things, such as a wall rising up in front of me, and other objects ; it also makes me timid and uncertain. This feeling lasts four or five hours, the headache and uneasy feeling continuing until next day. I do not mean to use it any more. When smoked it makes the throat dry, and I can hardly swallow anything."

(6) Sergeant W., 1st Essex Regiment, states : "I am sorry to say that personally I cannot give much information about the

use of cordite, as I have only experienced the effects when using it to light my pipe or cigarettes, which gives the smoke one inhales a not unpleasant sweet taste. I have spoken to some of my comrades, whom I have seen using cordite for lighting purposes, on the subject, and they tell me that they had also noticed the sweet taste and experienced a slight passing headache or giddiness. I have seen the men eat cordite just out of curiosity, to see what it tastes like. They said it had a sweet taste, but did not complain of any after effects. I have not seen cordite eaten in any great quantity. Nearly every man of the company used it for lighting purposes."

(7) Statement of Trooper Y.: "I first became aware of the fact that cordite was being used by our men during the middle of March of this year, by reason of one, 'R', in the Scouts, asking me to give him some morphia or cocaine to straighten him up, he having told me he was using cordite, and also having noticed that some of the men became very elevated after taking but a small quantity of beer, when they formerly could take a quantity, which did not perceptibly affect them. Inquiring as to the causes, I learned it was cordite. At this time the majority of the users only took it in small quantities to prolong the effect of beer, but as they became more familiar with its effects they increased the dose, with the result that it was productive of many fights among themselves and much subsequent pain. Cordite alone does not seem to make men crazy, only superinducing a very heavy sleep, but taken with beer or spirits it brutalises the mildest man and makes a temporary maniac of him. If a man has any bad traits, cordite and beer will bring them to the surface, developing and in most cases aggravating them. From personal observation, I have made from time to time, I have noticed that it seems to apparently age a man rapidly, and to make him exceedingly negligent and regardless of his personal appearance. This fact was all the more forcibly impressed on me from the circumstance that I was thrown in intimate contact with habitual cordite eaters on board the transport 'Rossetti.'"

(8) Lieutenant Morton (R.A.M.C.) has given me the following account: "Trooper R., sailor, aged 35, from Indiana, U.S.A., came to South Africa with mules, and enlisted at Durban in order to see fighting. He had been addicted to the opium habit for the last fifteen years. He usually takes 2 grains of morphia hypo-

dermically, and has taken as much as $3\frac{1}{2}$ grains. He has also been given to opium smoking, and has smoked as many as thirty pills in a night. He did not know the amount in the pill. When he first began smoking, two of these pills were as much as he could stand. He has also used cocaine a good deal, and has been a hard drinker all his life. He first used cordite as a substitute for these drugs while he was stationed at Landspruit, and the usual amount taken was the contents of one cartridge. At first he chewed the cordite and took it at night. After taking it his face became hot and flushed, and he felt as if his head was beginning to swell. There was intense throbbing of the temples, but he did not notice palpitation or excessive action of the heart, nor did he feel hot and flushed over the body. There was no profuse sweating. Very soon, however, he began to feel drowsy, and he was sound asleep in about half or three-quarters of an hour. The cordite was taken about 8 p.m., and he slept until 6 a.m. next day, when he was wakened up to prepare breakfasts. Then he felt a miserable wreck, had a foul mouth and splitting headache, which continued most of the day, was nervous and shaky, and felt very much as if he had drunk much bad whisky the previous night. Latterly he had become more scientific. He puts his cordite into about half a pint of decoction. This he drinks right off. He has used it in this way both at night and also during the day, when no beer or other alcohol was available. He says he has never put it in his beer. Latterly he has been drinking a good deal, and has taken this cordite decoction as a substitute at times. The drowsy sensation is not now felt as a rule, but instead he thinks it has a tendency rather to brace him up more or less, evidently acting as a pick-me-up."

In submitting these somewhat discursive notes, I realise that they do not constitute a very scientific account of what must be a rare form of vice. The notes were put together while on field service, and the facts were gathered mainly from individuals not best fitted for the analysis and observation of exceptional psychological conditions. They struck me as being of unusual interest, and possibly others may have observed similar cases. The symptoms and effects produced by cordite are sufficiently forcible and unpleasant to prevent any but the most depraved resorting to it as either a cerebral stimulant or sedative. I do not think the effects are such as are likely to help a man to

escape service, except it be by incarceration as a hopeless lunatic or by *felo de se*. In any case, it appears to me to be desirable that the notes regarding this class of case should be recorded, if only as guides for the detection and study of what, I believe, is a hitherto unrecorded form of intoxication.

CONSERVANCY METHODS AND ENTERIC FEVER INCIDENCE IN INDIA.

BY CAPT. J. M. BUIST.
Royal Army Medical Corps.

IN his excellent report on "Enteric Fever amongst the British Troops in India," published as an appendix to the Army Medical Department Report for 1900, Major McCulloch, R.A.M.C., states that "the causation of enteric fever is the question of the day for the army sanitarian"—a statement which will be emphatically endorsed by all who have watched the ravages of this disease in India and in Africa. It is a very remarkable fact that the methods which have been so conspicuously successful in stamping out cholera amongst British troops in India have met with as conspicuous failure in the case of enteric fever. Major McCulloch's report shows that the general improvement in sanitation in India, particularly in the direction of improved water supply, has been followed by little, if any, corresponding reduction in the prevalence of enteric fever. On the contrary, some of the cantonments which have the best and most carefully protected water supplies have an unenviable notoriety as hotbeds of enteric fever. The balance of evidence goes to prove that, in India, *direct* pollution of the water supply by specifically contaminated discharges is not of common occurrence, and that the cause of the bulk of the cases of enteric fever must be sought for elsewhere. It is practically certain that enteric fever cannot originate *de novo*, and every fresh case must therefore be derived directly or indirectly from a pre-existing case. As the specific bacilli are voided only in the fæces and urine, and, according to Wasdin, occasionally in the sputum, it follows that the safe disposal of these discharges is of the first importance to prophylaxis. If these discharges could in every case be rendered innocuous, enteric fever must of necessity die out, and the problem of its prophylaxis is thus inseparably bound up with that of conservancy.

Though the discharges of all cases among British troops admitted to hospital are mixed with sawdust and burnt, this is by no means an efficient protection to the community, for the specific bacilli may still, in a variety of ways, gain access to man, notably in

cantonments where the general excreta is not burnt, but disposed of on the shallow trench dry earth system, known in India as the Allahabad method. The general excreta may be specifically polluted by ambulant cases of the disease, by cases of persistent bacilluria discharged from hospital, and by the not uncommon occurrence of the disease among the native population. Once the liability of the general excreta to occasional specific pollution is admitted, its safe disposal becomes nearly as important as that of the known specifically polluted discharges from hospital.

The experiments of Majors Firth and Horrocks, reported in the *British Medical Journal*, September 27, 1902, prove conclusively that the dry earth system of conservancy in general use in India offers favourable conditions for the survival for long periods of any specific bacilli which may gain access to the excreta. The specific bacilli are thus frequently planted out around cantonments and every surface trench may become a potential focus of the disease from which specific bacilli may pass, in rare cases, directly into water supplies; or, more commonly, may be carried back to cantonments by flies or in the form of infected dust, and so secondarily infect water, milk and food supplies. Most observers of Indian experience will agree that such secondary limited infections of water, milk and food supplies are of much more common occurrence than the general infection of a water supply by direct contamination with specific discharges. The Allahabad system of conservancy, though convenient and cheap, must be regarded as highly dangerous. The excreta disposed of must frequently be specifically contaminated with the bacilli of enteric fever, and as this system favours the survival and dissemination of these bacilli, it must be regarded as one of the chief means by which enteric fever is fostered and spread. The immediate and effective sterilisation of the discharges of every case of enteric fever is the very fountain-head of prevention, but, owing to the impossibility of isolating every case, it is impossible to ensure this by any measure short of the sterilisation of the discharges of the entire community.

The destruction of all specific bacilli while still local is the natural first line of defence, and is in reality an offensive defensive measure. Once the bacilli have passed this line of defence and have become widely disseminated, preventive measures in the direction of the protection of air, water, milk and food supplies, are less certain, more expensive and, as events have shown, com-

paratively ineffective. Such measures constitute, in fact, only the second line of defence and are strictly defensive, as they do not aim at the destruction of all specific bacilli, but merely endeavour to ensure that they are not re-introduced into the bodies of susceptible individuals. A third line of defence is the protection conferred by inoculation with Wright's anti-typhoid vaccine. This, too, is a strictly defensive measure, as it aims only at raising the proportion of insusceptible individuals. Hitherto the chief efforts at the prophylaxis of the disease have been in the direction of strengthening these second and third lines of defence. It is surely more rational to strengthen the first line by attacking and destroying the specific germ while it is still local. The practical application of this latter idea involves a consideration of the means at our disposal for sterilising excreta on a large scale. This may be effected (1) by chemical means ; (2) by incineration ; (3) by boiling.

(1) *Chemical means*.—These may be briefly dismissed, as hitherto the chemical sterilisation of sewage on a commercial scale has not been a practical success. Further discoveries may, however, again bring these methods into prominence. The use of germicidal solutions will probably be found a useful adjuvant to the method of sterilisation by boiling.

(2) *Incineration*.—Large incinerators are already in use in many hill stations where the conformation of the ground does not admit of trenching. Unfortunately, the perfect incinerator has not yet been invented and those now in use can only be described as modified successes. Carefully conducted experiments have shown that this method is from four to nine times as expensive as superficial soil burial. On a small scale incineration is carried out in every garrison hospital where the dejecta of all cases of enteric fever are mixed with sawdust and burnt in a small brick and iron incinerator. These "chulas" cost from 7 to 30 rupees, are quite effective and cause no nuisance. I have seen incineration on this small scale very effectively carried out, without nuisance, in an ordinary kerosine oil-tin provided with a lid. In some few hospitals special destructors are in use. In one of these patent destructors (Donaldson's) the air which feeds the fire is drawn over the pail contents, the effluvium from which is thus carried through the fire and so deodorised. Now this system of local incineration, which has proved a practical success in hospitals, could be easily

extended to all existing latrines in barracks and bazaars, a small "chula" being built in the immediate vicinity of each latrine. The great advantage of this local incineration is that it kills all germs at the earliest possible moment before they have had time to become disseminated, and it obviates the necessity for a preliminary collection of excreta with its attendant risks, such as is required when large incinerators are in use. Its disadvantages are that it is difficult to deal with the urine on this system and the urine would have to be separately heated; the system is, moreover, somewhat unnecessarily costly, as the heat required to complete incineration is far more than sufficient to kill the specific germs. Difficulty might be experienced in obtaining a sufficient supply of sawdust or other combustible material to mix with the excreta. In many hill stations fir cones and pine shoots in large quantity are to be had for the small cost of collection, and these, where available, might be used to replace sawdust. There are many stations at which such a scheme would be found practicable, and there is no reason why it should prove more costly than incineration in large incinerators.

(3) *Boiling*.—This involves the introduction of a limited water carriage system. All existing latrines could be easily converted into trough closets, the water supply of which need be but very small in amount—only just sufficient to keep the trough clean and prevent nuisance. Twice a day the contents of the troughs could be syphoned off into a boiler placed at the end of each latrine, and, after the urine from the urinals had been added, the whole could be boiled and subsequently safely disposed of on to land. Major Cummins, R.A.M.C., has devised an apparatus for sterilising excreta by boiling which is effective and is stated to cause no nuisance.

The principle of the Donaldson Destructor could be easily adapted to any boiler and would effectively prevent nuisance. The addition of some cheap germicide to the sewage would lower the temperature necessary for sterilisation and so would lower the cost of this method. It may be urged that the expense of such a scheme would be prohibitive. In many stations the drinking water for the troops is boiled and the expense of this is not considered prohibitive. The amount of fuel which would boil two pints of drinking water (the amount allowed to each man) would suffice to sterilise by boiling the excreta of several individuals, and if this were effectively done the necessity for boiling drinking water would

disappear. Such a scheme disposes of the urine as well as the solid excreta, and kills the germ at the earliest possible moment. There is every prospect that it would be found quite practicable and decidedly cheaper in the long run than incineration, though the initial cost would be greater.

One of the conclusions arrived at by Majors Firth and Horrocks was, that there is no evidence that the enteric bacillus in soil could increase or grow in different directions. This conclusion at once raises the question whether a reversion to deep trenching would solve the problem of the safe disposal of specifically infected excreta. Deep trenching is open to the objection that it permits of the survival of the specific bacilli and does not obviate the risk of their direct percolation into a water supply. This risk is, however, a slight one, as trenches are never placed near water supplies. The advantages of deep trenching are that it is no more costly than the Allahabad system, and it would afford protection from wind-borne germs. The great objection to this system, however, is its failure to destroy the specific germ.

I have endeavoured to show (1) that the methods of prophylaxis which allow the specific bacilli to survive and become disseminated and which aim only at the prevention of its introduction into the bodies of susceptible individuals, have met with conspicuous failure in India ; (2) that it is more rational and quite practicable to attack and kill the germ while it is still local. The practical application of this latter idea involves a radical change in conservancy in India. Though in the light of Majors Firth and Horrocks' experiments, the superficial burial in earth, or Allahabad system, stands condemned, it cannot be swept away until some practicable, better and safer system can be substituted. Such a system can only be arrived at after extended experiment, and in view of the importance of the subject a beginning should be made without delay. I would suggest that the initial experiments might usefully take the following form :—

(1) In view of the increased importance of incineration, let Government offer a really valuable prize for the best incinerator.

(2) Select some station which, under present conditions, may be relied on to furnish annually a considerable number of cases of enteric fever. The selected station should not have too large a bazaar population. In this selected station abolish entirely the dry earth system in hospitals, barracks, bazaars and private bunga-

lows, and substitute either local incineration or local boiling of all liquid and solid excreta. The abolition of the dry earth system in the selected station must be absolute. The effect of such radical measures on the prevalence of enteric fever could thus be watched and much valuable information gained. An experiment of this magnitude is no new departure. At the instance of the Commissioners of the Royal Society, the Indian Government is now conducting a very costly experiment in the prophylaxis of malaria at Mian Mir, the importance of which lies not in the prevention of a little malaria at Mian Mir, but in the fact that Mian Mir is being made a test case, and in the event of success there, the measures which have proved successful will no doubt be extended all over India. It is surely as feasible and no less important to conduct a similar experiment in the prophylaxis of enteric fever.

(3) Deep trenching, though falling short of the theoretical requirements of a perfect system, might be given a trial at a selected station.

The whole sanitary environment of the soldier is the subject of the most assiduous, constant and intelligent care, and is more carefully supervised than that of any other community, yet enteric fever—theoretically an entirely preventable disease and one whose etiology is comparatively well understood—exact a very heavy toll from the soldier in cantonments and in the field. This state of affairs is a constant reproach to every officer of our corps, and as the fault does not lie in want of sanitary supervision, it can only be due to wrongly directed or faulty methods of prophylaxis. Majors Firth and Horrocks have performed a great service in directing attention to the grave dangers of the Allahabad system of conservancy. To devise a safe and practical substitute for this dangerous system is of the most pressing importance. The problem is one of very great difficulty, but until it is solved there is little hope of any large reduction in the incidence of enteric fever.

THE MEDICAL SERVICES IN THE FIRST LINE.

BY MAJOR R. J. C. COTTELL.

Royal Army Medical Corps.

THE following notes are the outcome of certain experiences while in medical charge of an Infantry battalion during the late war. Some of my conclusions and views may not be accepted by everyone, but they will, I hope, serve to direct attention to a few of the difficulties and problems which are associated with medical service in the first line.

The causes of men falling out on the march (apart from blistered feet) are, in the early morning, diarrhœa and colic, and later in the day, exhaustion due to heat and fatigue, producing a tendency to heart failure. The latter is sometimes a most serious condition, and having once affected a man, tends to return again and again if he undergoes any extra exertion. These cases multiply rapidly if the physical strength of the men cannot be kept up by good and sufficient food, with the necessary amount of sleep and rest. Blistered feet are very common after the first day's march and for perhaps another two or three days. After the first three days this condition is not a serious cause of incapacity. I generally found that when new boots had been issued, a necessary evil in a long campaign, my care had to be redoubled on the first day or two out of camp. It is impossible for men to march with badly blistered feet, but it is fortunate that one or two days' rest in the ambulance, coupled with cleanliness and the application of vaseline, invariably makes the men quite fit again for the road. My rule has been to open a blister always, and also direct that, after bathing, the feet must be very thoroughly dried and fresh socks put on.

In the above-mentioned cases of exhaustion, I found that if the men were relieved of their rifles and ammunition, they were then generally quite able to continue the march, showing, I think, that the extra strain of carrying heavy weights and also the pressure on the chest of the straps, had been too much for the heart. The loaded pouches pressing more or less on the heart, stomach, transverse colon and liver, were causes also of great discomfort and many complaints, and possibly were one of the causes of the early morning diarrhœa. I think the bandolier is a much better

arrangement, and I am sure the men much prefer it. The cardiac exhaustion cases were much more frequent among the men of the volunteer company, than among the regulars, probably due to the former being less accustomed to the life of a soldier on active service. The regulars, too, of the battalion I was with, had mostly been serving in South Africa about two years before the war, and may not have felt the heat, exertion and the strangeness of their surroundings so much as the men of the volunteer company.

When speaking of the medical arrangements for a battalion on the march, it is as a rule not plainly enough stated that medical attention is always called for sooner or later, and also that this attention will include the means which the medical officer has of getting the sick and wounded into camp. Whether the battalion is or is not attacked by the enemy, the cases of incapacity for marching will occur and arrangements should always be made to meet them. The numbers will, as a rule, be in proportion to the length and difficulties of the road, as well as to the climate and the fitness or otherwise of the men. If the battalion is forming a rear-guard I know of no more difficult position for the medical officer. The battalion is continually falling back, and therefore frequently and unavoidably placing the regimental stretcher bearers and the ambulance between their own and the enemy's fire. It is particularly on such occasions that a sufficient number of ambulances must be available for the use of the medical officer. The conditions are so varied that it is not possible to lay down rules to meet all cases, beyond emphasising the fact that he must make the best of the situation, and above all things get his ambulances emptied at every possible opportunity. Professional aid on the march is generally limited to giving temporary attention either of a medical or surgical character to any man needing it. The wounded or sick from flanking guards must be brought to the central roadway and, if unable to march, must either be placed in the ambulance attached to the battalion, or, if this is already full, they must be given a slip of paper showing the name of the man, his regiment, the cause of incapacity and a request for conveyance to the camp. This paper will be signed by the medical officer and presented by the man to the officer commanding the Bearer Company. The medical officer must enter all cases going sick in his own note book for the information of the officer commanding the battalion and the P.M.O. of the column. Sometimes it is necessary to leave one

or two stretcher bearers with the man, though, unless the man is seriously hurt or ill, it is best to take the bearers on with the battalion, or they may not find it possible to catch up their unit, especially if they are carrying a stretcher. It is of course quite impossible to carry a loaded stretcher at the pace a regiment usually marches, and yet this simple fact is not at all well understood by many officers.

Attention to the wounded during an action is now perhaps more difficult to carry out than when the range of firearms was of less extent. The difficulty is due to two main causes, firstly, the extensive area covered by the battalion, and secondly, to the doubt as to whether the danger to the wounded man, as well as to his bearers, justifies the attempt at removal, except during a lull in the fight. It is generally quite possible to reach the wounded man and apply a temporary dressing, but if you give him a voice in the matter, he will as a rule prefer to lie where he is. Often he is in or near some comparative shelter, selected perhaps by himself when advancing. I certainly do not consider the rapid carrying from the field of all wounded to be the chief thing to aim at, and most of those to whom I have spoken agree with this view. The best possible arrangement for the safety and welfare of the man, under the circumstances, is what should be tried for ; there can be no hard and fast rule to meet all cases. Dressings should be of the simplest kind, remembering that permanent dressings are not applied on the field, but are carefully and deliberately applied in the field hospitals. The wounded should be collected in some central sheltered spot, if that is possible, and there temporary dressings should be applied, the medical officer keeping up as well as he can with the battalion. When the stretcher bearers from the Bearer Company are at hand, they take charge of the wounded and carry them to the rear, otherwise it will be necessary to leave one or two regimental bearers to see that the men are properly looked after, the medical officer giving orders to these bearers to rejoin the battalion as soon as possible and report themselves to him for instructions. The collecting and dressing stations are not separate places when speaking of the medical arrangements of a battalion. The medical officer cannot be at several places at once, and it is therefore necessary to select central dressing stations as he advances.

When a battalion is attacking, I found the following positions

for myself and the regimental stretcher bearers to work satisfactorily. The battalion will be in the usual open formation, with a frontage of half a mile, and the depth from front to rear being probably about 500 yards. If the country is only moderately uneven or covered by bush, it is impossible for the medical officer to get a good view of the fighting line; I therefore placed two stretchers (eight bearers) to the right and left of me, they were well extended and marched between the first and second line of the attack. The Corporal carrying the field medical companion and one water-bottle remained with me, either in or near the second line. By this arrangement I could as a rule see the two stretcher squads to my right and left, and the bearers could at any time inform me as to any casualties that were occurring in the lines near them. I sent the surgical haversack and remaining water-bottle to the flank where the greatest number of wounded might be expected. The bearers, it will be found, soon come to the limit of their strength when carrying loaded stretchers; the medical officer must therefore arrange to have their journeys shortened as much as possible or their use as bearers will soon be lost to him. It should be noted that the man's blanket or great coat makes a better and safer mean of carrying him down the side of any steep or rocky hill than does a stretcher. Sometimes a severe injury to a leg or other part will make the use of a stretcher absolutely necessary, but in this matter the medical officer should himself make the decision. If the man must be placed on a stretcher at least six men will be required to carry it down any rugged hill with safety. With regard to tallies I consider it is not possible or necessary to fix them on to every wounded man, but it is necessary to attach them to all serious cases and to write a few particulars of the wounds or other injuries (name, regiment, &c.) in the medical officer's notebook for the future information of the P.M.O. and O.C. of the battalion after the action.

I am strongly of opinion that increased accommodation for the carriage of the sick of a battalion on the march should be allowed, and it must be plainly laid down that the ambulance wagons are under the control of the medical officer of the regiment, and he must be careful to see that they are always used for their legitimate purposes. I would recommend two light four-wheeled ambulances, drawn by two horses, each of which can be driven and looked after by one man on the march. The Canadians had

a light ambulance of this character, which I had the use of at Belfast. These two ambulances would carry easily between them, four lying down and six sitting patients. These small ambulances are more generally manageable, do not require such expert drivers, carry between them more patients than one ordinary ambulance of the official type, and only require the same number of horses and men. They should be with the battalion during the march, but in camp and when an action is pending they should rejoin their unit, *i.e.*, the Bearer Company. If it is necessary to have an ambulance with a battalion in camp on account of the distance of the men from the nearest hospital, this could be easily arranged. The Bearer Company should only lend these ambulances to the medical officer of a battalion for the march.

The advantages of having two ambulances is, that if one is delayed to pick up a wounded or sick man, the other can keep up with the battalion and be ready for use. There is another point. I think it will be admitted that the medical officer of a battalion is the best judge as to which men should be carried, and it should not be left to the Bearer Company to decide which are the deserving and proper cases to ride in the ambulance wagons. I have heard it suggested that two-wheeled ambulances are as useful as four-wheeled; I do not agree to this. With the latter the same number of horses are needed, they are more comfortable and are safer. If on the march or in any temporary camp, the lying down cases can remain safely in the four-wheeled wagon, while the horses are taken out to graze and water. The number of stretchers with a battalion, I consider, should be six, that is four for use in action and two to be kept in reserve. The present pattern stretcher is very serviceable. A lighter stretcher could be made, but for all-round, general work, there is little to be said against the present one; the firm sides and the wheels raise it off the ground when the bearers are resting and this is imperative in a good stretcher, making it far preferable to the lighter ones that are often illustrated and described as superior to our own.

The regimental stretcher bearers, according to regulations, march fully armed with their respective companies, and only when an action is about to take place are they to report themselves to the medical officer. This appears to me to be a most serious mistake, which is largely due to making an erroneous distinction between the position the battalion is placed in "on the march," and "in

action"; the battalion is, on active service, in an enemy's country, and therefore is always in the position of a battalion in action. The bearers may not always be able to report themselves "when an action is about to take place," or if they can do so, the Maltese cart may not be to the fore for some reason and there is therefore no place in which to put their arms and ammunition, and no stretchers ready for them; besides, the Corporal told off to the medical officer cannot be expected to carry the medical companion, surgical haversack and two water-bottles, until relieved by the bearers. The medical officer and the battalion lose in fact three-quarters of the usefulness of the bearers by the present arrangement. There is nothing gained by making these men tire themselves on the march, by carrying rifles and ammunition and the necessary belts and straps, if they are not to use them when the enemy comes in sight. The stretchers should, as already ordered by regulations, be carried in the Maltese cart when the battalion is marching, but should the cart for some reason not be available, it will be found that two stretchers are the outside number that can be carried by the bearers with advantage. The remaining four must be placed with the medical panniers in one of the company wagons. This arrangement is only to be regarded as a make-shift and is most inconvenient, though on many marches it was the only practical method.

The medical officer must keep his men as fit as possible; tired men are useless, and unless the length of the march is known to be quite short, two stretchers will be as much as can be managed, and, at the same time, have the men fit to meet emergency cases. I look upon the training of bandsmen, in time of peace, for the position of stretcher bearers in an action, as, to put it mildly, a waste of time, for the reason that trained musicians will never be given by the officer commanding to carry out the dangerous duties of stretcher bearers. Besides, the band is usually left at the base, and, as these men are therefore not forthcoming, it means that all the work of training fresh men devolves on the medical officer, at perhaps a most inconvenient time. The following arrangements, by permission of the officer commanding the battalion to which I was attached, were carried out by my wish and worked well under all kind of conditions. There were practically no bandsmen, trained or untrained, and regular instruction of the bearers had therefore to be commenced at once. The N.C.O. and regimental stretcher bearers handed in their rifles and came immediately under

my control from the commencement. The N.C.O. carried the medical companion and one water-bottle; the surgical haversack and the other water-bottle was carried by one of the stretcher bearers. The men were therefore from the commencement non-batant. I trained them and, as they rapidly gained in experience, they were most useful to me, quite as much on the march as in action, and were also of great use in camp. They marched with me in rear of the battalion, unless owing to the formation of the advance the companies were at all scattered, they then joined their companies, reporting to me if there was any man requiring attention. Sometimes, on convoy duty, the battalion was divided up into advance, rear and flanking guards, and the bearers were then of great use, as I could always feel that no man would be neglected. On arrival in camp, strong picquets are frequently marched off at once to occupy any hills overlooking the camp, and the stretcher bearers were always ready to go with their respective companies, taking a stretcher and a water-bottle with them. If anything unusual occurred, one of the men came in and informed me, or the injured man was at once carried into camp on the stretcher.

At present the arms and ammunition of the regimental stretcher bearers must be placed in the Maltese cart under the care of the one orderly told off by regulations for this purpose. Besides, therefore, the questionable correctness of carrying arms in a cart marked with the red cross, there is the probability of their going astray, leading perhaps to considerable trouble for the medical officer. The Maltese cart should always be for purely medical equipment at all times. Commanding officers of battalions do not always look on medical arrangements as seriously as they deserve; implements such as entrenching tools and all kinds of camp necessities are at times placed in the medical cart. It would be well for the medical officer to be able to refer to some strong ruling in this matter, as, if he is to be of the greatest service to the battalion he must have the Maltese cart entirely for his own equipment. Handing in the stretcher bearers' arms and ammunition from the first paves the way to bringing the bearers and the Maltese cart with its contents under the protection of the Geneva Convention; as I think they should be. The bearers could then wear the Red Cross instead of the usual "S.B." brasard. The friction that was caused between the Boers and ourselves on these

points would then not have arisen. It was, I found, quite impossible to state clearly to anyone what was the true position of regimental stretcher bearers, and I could not but agree with the Boers when they fired on my men, as by our own showing they might become combatants at any time, and were therefore, they considered, fairly open to be shot, even if acting at the time as stretcher bearers.

I do not consider that enough use is made of the medical officers attached to regiments, especially is this noticeable in camp. It could be always arranged that they should look after all minor cases of disability themselves, not troubling the hospitals, and it would be a good thing if the medical officers were always members of a "Camp Sanitary Committee" acting under the P.M.O. The above method was used very generally during the war, but as it is not laid down in regulations definitely, commanding officers were inclined to think that they could excuse the medical officer attached to their particular unit from any duty that seemed to be outside the actual limits immediately affecting the battalion.

The following notes and suggestions would, I consider, make it possible for the medical officer of a battalion to be more generally useful than at present, and are chiefly addressed to alterations in the medical equipment. A larger amount of surgical dressings should be allowed, and I would suggest a similar box to the "anti-septic case" (tin lined), containing much the same material and having a smaller "expense" box inside it for holding the materials in actual use. The medical officer of a battalion is not as well equipped as he ought to be to meet ordinary dressings and to combat minor complaints. A much larger amount of vaseline or some similar material for blisters or chafed parts should be allowed. The perforated zinc for making splints, together with the hammer and anvil, are not suitable things for an officer to depend on in the field. He is not always in a position to make a splint from such material just when it is required, and I consider perforated zinc and the card-board supplied cannot take the place of the ordinary wood or wire splint. The medical officer should have a sufficient number (say two sets) of reliable, ready-made splints with him. I think the addition of another surgical haversack (which would allow of one for each half-battalion) is required, and if three more water-bottles were allowed, each stretcher squad and the N.C.O. with the medical officer would then be in possession of one. This additional equipment would well repay the

extra labour of carriage. On the march the medical officer must be able to treat cases of diarrhoea, colic, ordinary colds, malaria, dysentery and collapse, and this leads me to suggest that increased quantities of the drugs to meet these diseases might take the place of the following rarely used remedies in the medical panniers: *i.e.*, gallic acid; argent-nit.; antipyrine; iodoform; aconite; pot. bicarb.; Blaud's pills, and also the large quantities of pulv. ipecac. The amount of tinct. of opium might be doubled and the extract omitted; the quantity of castor oil should be increased, while the olive oil could be omitted. The case containing the hypodermic syringe would be improved by adding a little cup that would stand, and large enough to allow the top of the syringe to enter it. For use on the field, I would suggest a flat leather case divided into two compartments, which would fit into the left breast pocket; one compartment to contain a flat bottle (capable of holding half an ounce of a solution of morphia), the mouth of which must be fairly wide or fitted with an india-rubber tube to allow the solution to be easily drawn into the syringe; and the other, a metal case with screw or bayonet catch lid, to hold a hypodermic syringe and two needles. It is very difficult, with our present arrangements, for a medical officer to have the morphia solution and the syringe always at hand, and I think the above would perhaps meet the difficulty. The solution for the bottle can be freshly made before an action, using the case of tabloids. A binaural stethoscope should take the place of the present single one, as nothing can be heard with the latter in camp. Two good-sized enamelled basins would be a most useful addition to the medical officers' equipment. An additional lantern and some cleanly means of carrying a supply of candles is required.

In the A.M.D. report for 1899, page 467, there is a description of an "emergency carrier"; it would I think be of service for bringing in cases from short distances that do not require a stretcher, and as the "carrier" only weighs eight ounces it seems worthy of a trial. Light frames on wheels called the "MacCormack-Brooke," for carrying loaded stretchers, were used in hospital camps a good deal and gave much satisfaction. I think if these were modified they would be of use on the march, in action and also in camp, saving the labour of turning out an ambulance for perhaps one case of sickness, and also because they would be able to go into many situations that would be impossible for an ambulance; and

yet the fatigue to the bearers wheeling the carriage is very slight, and two men could bring the patient many miles over a fair road with moderate comfort to the man and ease to themselves. The modifications recommended are the following: the wheels must be made about 6 to 9 inches less in diameter and the legs increased from two to four, the wheels themselves must be made easily detachable from the frame, so that when the carriage is not in use the whole can be easily packed into the Maltese cart. These modifications would allow of two bearers lifting a loaded stretcher on and off the frame with ease and safety, which the present wheeled carriage does not. I would suggest one or two of these wheeled frames for each battalion.

It is necessary that a medical officer should have at least two tents; they should be part of his equipment and be carried in the Maltese cart. One tent is his "inspection" tent and serves also to keep the dust and rain off his technical equipment; the other is the "emergency" or "detained" tent, to receive any sick man from the company lines, and in which he can wait until a conveyance to hospital can be provided. There is no mention in regulations that I am aware of, that a batman or groom should be told off to the medical officer of an Infantry battalion; this man takes charge of the officer's horse during an action and also immediately on arrival in camp—he is therefore an absolute necessity.

The following men of the battalion should be considered always at the disposal of the medical officer:—

One N.C.O.

Sixteen stretcher bearers.

One orderly to look after the Maltese cart, and who can act as the officer's personal servant.

One groom.

I found it quite impossible to work with less than this number, viz., nineteen; it is not excessive and the medical officer should be able to refer to regulations that he is entitled to these men. If he is short handed it is impossible for him to do his duty.

For the Maltese cart the following contents are suggested:—

Six stretchers and one or two "wheeled frames."

Two field medical panniers (Nos. 1 and 2).

One antiseptic case or similar box.

Two special tents.

Two hand basins.

A sanitary officer, under whom all the medical officers of units would act, should always be appointed to a Division. With a smaller command the S.M.O. would naturally be the chief sanitary officer. The sanitary officer must be a man whose opinion will carry weight with the commanding officers from his acknowledged experience, as well as from his rank. The need of such a sanitary medical authority was very apparent in many of the large camps in South Africa. New comers were frequently marched on to ground only lately left by other units, a wrong thing in itself and doubly so when the corps leaving had suffered much from enteric fever or diarrhoea. Proper care of the water supply was frequently not taken in large camps. Small camps were, as a rule, well cared for, perhaps because insanitary conditions were more easily seen, and it was not such a large undertaking to remedy them. Personally, I did not find the Berkefeld filters were a practical success; they were easily damaged in carriage as well as by careless or hurried working of the pump. On many of the marches the water was too thick or too slimy to put through any filter of this kind. Also, the men will continue to drink from any stream or dam, in spite of all warnings. It is probable that except when in camp for a day or two the men do not get filtered water to drink, even once a day. I tried many times to work these filters successfully, but I could not shut my eyes to the fact that most of the water drunk by the men had not passed through the filters. It is, I think, quite impossible to keep very thirsty men waiting for a drink even when resting in a temporary camp. If a battalion is marching every day and starting almost before sunrise, it is not possible to fill the water-bottles with filtered water. Again, on arrival in camp one or two companies have frequently to march straight on picquet, perhaps before the wagons get into camp, so that filtration of their drinking water is out of the question. If Berkefeld filters or any other arrangements for the filtration or sterilisation of water are to be more efficiently used, a regular staff must be allotted for this most important sanitary duty, and drawing extra pay.

The *trench system* of disposal of excreta if carefully planned, well dug and filled in when within 18 inches to 2 feet of the surface, is very satisfactory for temporary or even for more or less permanent camps. For permanent camps, concreting the surface of the latrine should always be carried out, especially the ground on which the

pails stand. The pail system, as used at Bloemfontein was, I consider, not a success, chiefly because the floors of the latrines were not concreted and the ground around them consequently became very foul; the carts also, when removing the pails, frequently left a trail of filthy liquid on the roads through the camp. This was probably the main cause of the plague of flies from which we suffered a good deal. If trenches are used they should be covered in twice a day and the ground around them kept very clean, chloride of lime being freely used.

As to food, the biscuit ration was barely enough, and when reduced, as it was several times, to one half, it became starvation diet. Fortunately, we never had a very long spell of such short commons, but its evil effects were noticeable for many days after the men had again come on full diet; they were much weakened and could only do short marches with any ease. The reduction in the meat ration was not nearly such a trial, perhaps because it was frequently very poor in quality, tough and uninviting. The tinned beef in its different forms was very good at all times. The rum ration was much appreciated, and, I think, did nothing but good after some of the long and exhausting marches, especially during the cold months; but as a routine issue and especially in camp under ordinary circumstances, it should not be allowed, indeed, I often thought it made the men slow, forgetful and generally dull. I would prefer to see good whisky issued instead, on the exceptional occasions that spirits are needed at all. Tea might be allowed in more liberal quantities, say half an ounce per man daily; the men would carry it willingly and perhaps the knowledge of its refreshing qualities would help them to wait until the water was boiled and the tea added in their canteens. They are always keen cooks, and I believe the increased issue would be a good thing and perhaps help to prevent illness. Coffee was always greatly valued by officers and men. Cheese would have been greatly appreciated. Sugar and jam, of which there was a most liberal allowance, were much liked and were I think of great value as articles of food. No "fancy" biscuits ought to have been tried on the men; on some occasions rather daintily made biscuits, flavoured with ginger were issued. They were most unsuitable and not satisfactory as food.

Khaki drill I look upon as a distinctly dangerous clothing for many months of the year in South Africa, and I think serge

should entirely take its place. I have often seen khaki drill wet through with rain or perspiration, indeed, I have experienced this many times myself and know what the discomfort, apart from the danger, is like. The method of wearing putties over ordinary trousers, led to dragging at the knees and seat, and after a very short time the men's trousers were hopelessly torn at both places. Either peg-top trousers or knee-breeches, with double cloth at the knee and seat, would be an improvement, and they should be made of ample dimensions. Three or four pairs of socks are needed to allow of sufficient changing and washing.

As for the Geneva Convention, I do not consider many of its articles are nearly explicit enough, while several of them are fundamentally unsound. Something more charitable to the sick of both belligerents is necessary. I believe the Boers would never have fired on our sick and wounded if they had not heard of the Geneva Convention (I am speaking now entirely of my own experience in the field). The Convention allows that ambulances "held by a military force," or if not, if they are not carrying sick, can be freely fired on and taken by the enemy; surely this arrangement cannot be defended. How, for instance, can it be known whether sick men are in the ambulance or not? As far as my experience goes, sick or wounded men were nearly always in the ambulance on the march with troops. I have already stated that I think the regimental stretcher bearers should at no time carry arms and should wear the red cross and not the ambiguous stretcher bearer badge. There should in my opinion be no question as to the neutrality of all arrangements for the sick and wounded, hospitals and their equipment, bearer companies, isolated ambulances, medical equipment carts, stretcher bearers and others who are entitled to wear the Geneva cross. The distinction of regimental stretcher bearers, as being outside the Convention, is not workable, and led to a good deal of misunderstanding during the late war. An ambulance should be allowed to carry the rifles and ammunition of the sick or wounded actually in the wagon; the arms of course being liable to be taken by the enemy from the ambulance. I do not think any ambulance cart or hospital should "take charge" of arms and ammunition; if the sick or wounded bring their arms with them they must be handed over at once, if possible, to their proper units, otherwise to some recognised dépôt, and should never be taken "on charge" by those attending the sick. Medical arrange-

ments can never be regarded as neutral, if their carts and hospitals are full of arms. During the late war hundreds of rifles and enormous quantities of ammunition were taken on charge and kept in the stores of our hospitals. Having got rid of the arms and ammunition from the medical stores and carts, and also from the regimental stretcher bearers, the neutrality of those attending to the sick and wounded and of their equipment generally surely ought to be allowed, and no further unnecessary difficulties placed in the way of what is after all merely ordinary charity, and which equally affects both sides.

A FATAL CASE OF POISONING BY SULPHATE OF QUININE.

BY COLONEL R. H. QUILL.

Royal Army Medical Corps.

THE literature of quinine poisoning is very scanty, and a fatal result almost unique, hence my desire to place the following case on record.

Pte. McK., Royal Scots Fusiliers, a patient in Fort Pitt Hospital, Chatham, on the afternoon of October 20, 1896, was helping the wardmaster to remove some equipment from a cupboard which had on its upper shelf several stock bottles of medicines. While so engaged, he suddenly seized the first bottle that came to hand, and before anything could be done to check his action, swallowed the contents of the bottle. On examination it was found that the bottle had contained eight ounces of a concentrated solution of sulphate of quinine (5 grains to the drachm), *i.e.*, the bottle contained 320 grains of quinine. Owing to the concentration of the solution a small quantity of the quinine had fallen to the bottom of the bottle, forming there a thin layer, but at the lowest calculation 240 grains of quinine must have been held in solution and swallowed. This enormous dose of quinine within two minutes produced acute symptoms of poisoning. The man at once complained of sickness, retching quickly followed and was favoured by an emetic which had been promptly given. The face became flushed, violent trembling followed, with rapidly increasing helplessness. He was quickly undressed, put to bed and skilled assistance sent for.

The Orderly Medical Officer arrived within five minutes, but by that time the man had become quite unconscious. His condition was now extremely grave; face of a ghastly paleness and bedewed with clammy perspiration, pupils widely dilated, insensible to light and touch. Respiration greatly interfered with, breathing being accomplished very slowly and in spasmodic gasps most painful to witness. Pulse barely perceptible. Under very active stimulation, *i.e.*, brandy and beef tea *per rectum*, sinapisms to nape of neck, frictions with brandy over the cardiac region, and hypodermic injection of digitalis and ether, the pulse gradually

returned in good volume, but no other symptom improved. Unconsciousness remained complete, and the practically paralysed respiratory centre showed no sign of recovering itself. After a short interval the improved condition of the pulse began to rapidly subside, it flickered for a few minutes and soon could not be felt. This condition of pulselessness remained for several minutes, during which time the man looked like a corpse. Active stimulation being resumed, we were rewarded by finding the pulse returning, in a few minutes it again became full and strong. Though there was this remarkable improvement in the pulse, the respiration still showed no improvement. Artificial respiration was now tried but appeared to have no beneficial effect. Within a few minutes of the cessation of active stimulation the pulse again began to fail and became completely lost. Once more stimulation brought it back, but only for a brief interval. These disappearances and recrudescences of the pulse continued until 7.30; at that hour the pulse finally disappeared, no more to return, and a species of convulsion, which affected principally the lower extremities, was followed by death.

Post-mortem Examination.—Blood was very fluid and very dark in colour. The vessels of the brain were distended with dark fluid blood, and the cerebral substance generally much congested. Lateral ventricles full of serum. The liver, lungs and kidneys were intensely congested, but otherwise healthy. The stomach contained some six ounces of dark brown thickish, odourless fluid mixed with mucus. No inflammatory or corrosive appearance of the mucous membrane.

Remarks.—McK. had been but a few weeks in hospital, and his general health appeared to be good. For some ten days prior to his suicidal act a comrade in an adjoining bed stated that McK. appeared somewhat “queer” in his manner, his constant belief being that “someone in the barracks wished to fight him.” The officer in charge of his ward had noticed no mental aberration. One point appears to be plain, namely, that his death was due to what may be called a pure accident. There were no poisons classed as such in the orderlies’ cupboard; the man made no selection of the bottle he took; merely dashed at the cupboard, and having seized the first bottle that came to hand, swallowed its contents. By a curious mischance the bottle he seized was the only one that contained anything capable of causing death.

The remaining bottles contained ordinary stock mixtures, such as astringent, diaphoretic, expectorant medicines. When asked why he swallowed the quinine solution his reply was, "I do not know," his last coherent speech.

Looking back on the case, there are some omissions in its management which I greatly regret; and my regret is enhanced by the remembrance that for a considerable portion of the time during which the case was under treatment, I was not only present but had actively associated myself with the Orderly Officer in his efforts to save life. To my great regret the stomach pump was not used at the *outset*. Attention in that direction was distracted by the Orderly Wardmaster stating that he had given an emetic which produced free vomiting. Later enquiries (subsequent to the death) elicited the fact that the vomiting had in no sense been satisfactory. Another regret is connected with our employment of artificial respiration. That was not kept up with the thoroughness and persistency which the condition of the respiratory centre demanded. Lastly, strychnine ought to have been injected subcutaneously, for so employed it is a powerful stimulant to the respiratory centre.

Had the stomach pump been efficiently used within a few minutes of the act of poisoning, it is very possible that the fatal result might have been averted.

Editorial.

THE SURGICAL TREATMENT OF CHRONIC NEPHRITIS.

THE therapeutics of chronic nephritis, from a medical standpoint, are so hopeless that any surgical procedure which holds out the promise of even temporary amelioration of symptoms with retardation of disease progress, must be welcome. To Mr. Reginald Harrison we owe the original recommendation of renal puncture or incision in certain cases of chronic albuminuria, but to Dr. Edebohl, of New York, must be given the credit of adopting an original operation for the treatment of the chronic nephritis of Bright's disease. He, in 1898, deliberately exposed both kidneys, stripped off their capsules and fixed them in position, in a young woman of 26. Frequent examinations during the last five years showed her to be in every instance in good health, and the patient has recently married and continues well. In a recent article which appeared in the *Medical Record* of March 28, 1903, Edebohl reports 51 cases of renal decapsulation, and in 47 of these cases both kidneys were operated upon. Out of this large number 22 are said to be improving from three to fifteen months after operation. Recently a successful case of removal of the kidney capsule for chronic parenchymatous nephritis has been reported by Tyson of Philadelphia (*Medical News*, May 30, 1903, p. 1049), and five others by Drs. Blake, Burrell and Munro in the *Boston Med. and Surg. Journ.*, August 13, 1903. Two of the five are, for the practical purposes of business and occupation, well; two died at intervals of four days and six months after the operation, and one was not relieved. It is evident that the operation is attracting attention and that the results in certain cases, which have proved quite hopeless under the most careful medical treatment, have been eminently satisfactory.

The technique of the operation is simple and sufficiently similar to others upon the kidney to render a detailed description unnecessary. The patient is placed face downwards, the head projecting beyond the end of the table, the shoulders protected and slightly raised, the neck being, of course, absolutely shielded from pressure. This is best secured by causing the anæsthetist to support the

forehead on the hand. In arranging the sandbags or large pads under the patient's body, care must be taken that the action of the diaphragm is not interfered with. If the bags are placed high in the epigastrium, this result may follow; if, on the other hand, they be placed too low, the angle between the pelvis and thorax is not well opened and the kidneys may be actually displaced upwards. In a fat or œdematous person this may complicate the operation seriously. Occasionally hæmorrhage is troublesome from branches of the lumbar artery retracting after severance into the muscle fibres, but in thin patients it is sometimes possible to complete the operation without tying an artery. In fat and œdematous subjects the depth of the incision is surprising, entailing corresponding difficulty in reaching the kidney. The lower pole is usually reached easily, but the upper is often difficult to bring well up into the wound. Sterile tape slipped round and under this upper end, acting like a lasso, facilitates this part of the operation. The incision may be closed either by layers or by the "through and through silkworm gut sutures." It is a matter of indifference whether the kidneys be operated upon singly or simultaneously. All of Blake's cases were operated upon by two surgeons simultaneously, one decapsulating the right the other the left kidney. The time of the double operation is thus reduced by nearly one-half, and it does not appear that the patient is subjected to a noticeably increased amount of shock.

The actual decapsulation is best done by splitting the capsule longitudinally with a scalpel and then pulling it off gently with forceps and fingers. As a rule, the capsule separates without much difficulty. In very contracted kidneys it is more adherent, and occasionally carries with it pieces of the cortex. Persistent hæmorrhage from the kidney tissue is rare. The operation is always followed by a temporary diminution in the amount of urine, but this quickly disappears, and within a few days the amount usually exceeds that passed before the operation. An increase of blood in the urine and occasionally the presence of fat globules, is demonstrable for a few days, but there is no permanent increase of pre-existing renal elements of the urinary sediment following this surgical interference.

Edebohl says: "for the operation to be classed as a cure, the following conditions must be fulfilled: the urine must remain free from albumin and casts, and the output of urea be normal, or

approximately so, for a period of at least six months after the verification of the disappearance of albumin and casts, and the patient must be free from the symptoms of chronic Bright's disease from which he or she formerly suffered." Few will deny that this is a sufficiently rigid standard of cure, and it is remarkable that any cases should have conformed to it. The operation seems specially suitable in young persons suffering from post-scarlatinal chronic nephritis, and may possibly be of value in saving life where suppression of urine follows some trifling operation such as catheterism or after a chill. If it will relieve even the severer symptoms consequent on progressive uræmia, even though it fail to arrest the albuminuria entirely, there seems every reason to hope that it will fulfil much of the promise which has been claimed for it. The ready absorption of substances painted on the decapsulated kidneys of dogs and the appearance of fat in the urine immediately after the operation, show that kidney tissue is readily permeable from without its substance as soon as its fibrous capsule is removed. The successful results so far obtained are probably due to the establishment of a new blood supply to the kidney by the adhesions formed after decapsulation.

It is satisfactory to note that those who have taken up this surgical procedure have been commendably conservative in their methods, and we are, in consequence, disposed to look forward with some confidence to its further development, but, at the same time, we think larger experience is needed before we can be convinced that a general disorder like Bright's disease is cured by this operation. It may be that it will achieve eventually for itself a place in the recognised therapeutics of an otherwise progressive and ultimately fatal disease, but on this point we must take care not to be too sanguine.

EMPIRICISM IN SEWAGE TREATMENT.

WE alluded in our last number to the apparatus suggested by Mr. W. D. Scott-Moncrieff for the standardisation of sewage as a preliminary step to the laying down of installations for bacterial purification. We refer to this matter again as it is doubtful whether either the engineering or medical professions fully realise the value and importance of the suggestion. The complexity of the sewage problem is well known, in fact, a Royal Commission

has been sitting for five years inquiring into the subject, and is not likely to finish its work for some time to come. This being the case it is incumbent upon all, however remotely concerned in practical sanitation, to consider the subject in all its bearings. The history of attempts to purify sewage and reduce its ultimate products to manageable proportions is an interesting chronicle of the expenditure of vast sums of money with only moderate success. Theoretically, the return of man's effete products to the land is the proper solution of the question, but with the growth of population and the complexity of modern conditions of life, so simple a procedure is impossible. Efforts to cope with the problem by chemical treatment were on the whole as disappointing as they were expensive; and it was not until the period of the more or less synchronous and classical experiments of the Massachusetts State Board of Health, Dibdin, and of Scott-Moncrieff himself, on the effects of self-digestion and filtration of sewage, that the conception of a possible purification of this material by natural or biological processes was appreciated. The money, labour and ingenuity expended upon the development and perfection of bacterial methods of sewage purification constitute a characteristic feature of the scientific zeal of our day. It is unnecessary to refer to these details beyond recalling the fact that underlying the majority of these proposals is the principle of first subjecting the sewage to the action of anaerobic bacteria in a digesting or so-called septic tank and then passing it through some filtering medium, such as coke or clinker, in which, by the action of aerobic micro-organisms, the disintegrated and hydrolysed organic matter is oxidised or mineralised into stable and comparatively unobjectionable forms of organic nitrogen.

Although we cannot dogmatise as to the absolute facts and conditions essential in a septic or digestive tank for the liquefaction of the organic matter in suspension by a putrefactive fermentation of the sewage, we know that they are relatively stable and unimportant as compared with those essential for the nitrification of the organic matter in solution under aerobic conditions. It is precisely in regard to these latter stages of the bacterial treatment of sewage that the empiricism of the methods employed is most manifest, with the result that the time and money which have been thrown away in attempts to apply the experience gained in the treatment of one kind of sewage to the treatment of another

is incalculable. It is Scott-Moncrieff's contention that this waste will go on indefinitely unless the subject is placed upon a more scientific footing, and that in order to do this it is essential that, as in all other sciences, there should be some exact method of measurement or determination of essential facts that will be applicable to every case. It is quite obvious that if an engineer does not know with some degree of accuracy what is required he must be working in the dark, and until this question of standardising is settled it is impossible for the biolytic treatment of sewage to make any satisfactory progress. As we have pointed out,¹ the four principal factors upon which to base conclusions as to the character and dimensions of any installation for treating sewage are: (1) The depth of filter required to produce the necessary standard of purity in the effluent; (2) the quantity of air necessary for the life processes of the organisms in that filter; (3) the correct rate of flow per unit of filter-bed surface in order to obtain the best results, and (4) the best period of rest between each discharge to prevent gelatinous growths in the filtering material. These data are only to be obtained by employing some such standard apparatus as Scott-Moncrieff suggests, or by setting up a complete installation and gaining experience and knowledge of the facts by costly practical treatment of the sewage in bulk. The one method is logical, scientific and in most cases likely to be the more economical, the other is purely empirical, and not infrequently, as costly as it is unsatisfactory.

A study of this question forces upon us the view that we have now come to the parting of the ways, and that the time is ripe for the abandonment of empirical methods in our attempts to purify sewage by bacterial processes, and that we should approach the subject not only in a scientific spirit but by scientific methods. We do not know what attitude the present Royal Commission is taking in regard to the question, but we can hardly believe that this aspect of the problem has escaped their notice. For our own part we hope that engineers and others called upon to advise as to the purification of a sewage, especially those which are not normal, will not attempt to base their recommendations upon any but accurate data obtained by standardising the particular sewage they are dealing with, so that they may know exactly where they

¹ See JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, No. 3, p. 239.

are before recommending works upon a large scale. They may differ among themselves as to details or kind of plant they recommend, but at any rate they will know all about the four factors they have to provide for, namely, depth of filter, provision of oxygen, rate of flow and periods of rest. If this information can be obtained it ought to precede and be the foundation of every proposal for spending money, at any rate upon a large scale, on bacterial processes. A recognition of this principle is as much worthy of consideration by those responsible for advising expenditure on military works at home, in India and our colonies, as it is by those holding similar positions in civil life.

X-RAY WORK DURING THE SIEGE OF LADYSMITH.

WITH reference to the interesting article on this subject by Lieut. Bruce, which appeared in our August number, we omitted to state that the paper had already appeared in the *Transactions of the Röntgen Ray Society*, and been printed in their *Archives*, vol. v., No. 3, March, 1901. We regret that by an oversight this fact was not made clear.

Review.

MODERN BULLET WOUNDS AND MODERN TREATMENT. By Major F. Smith, D.S.O., R.A.M.C. London: J. and A. Churchill, 1903. 12mo, pp. 100.

This small book is part of the Alexander Essay for 1903, the subject set being, "Injuries of the Joints and Long Bones caused by Modern Projectiles, with Special Reference to the Appliances required, and available on Field Service." The subject of the essay was announced before the Boer War began, and Major Smith's little work is mainly based on his experiences among the wounded in that campaign. Many important lessons are to be learnt from that war, and military surgery will profit to a large extent from its surgical history, which has yet to be written in full. The writer discusses his subject under six headings, as follows:—Contusion of Bones, Partial Fractures, Complete Fractures, Comminuted Fractures, Injuries of Bone involving a Joint, and Injuries of Joints without involvement of the Bone. In addition to these he has a separate chapter on "Splints" for actual Field Service, and another on "First Aid," with special reference to fractures. Some diagrams which were appended to the original essay, the author tells us, have been discarded on the ground of expense. The book is a small one of a hundred pages, and is published by the well-known firm of Messrs. J. and A. Churchill, which in itself is a sufficient guarantee of its excellence in this respect. It is well indexed, and has been carefully revised.

The reader is perhaps a little disappointed that more cases illustrating the author's remarks on certain subjects are not forthcoming, but no doubt the scope of the book did not allow of this. The writer is very strong on the subject of Conservative Surgery, and we feel sure that his readers will entirely agree with him on the necessity of as little disturbance as possible of wounded parts by the probe or finger. The employment of the X-rays has done much to render examinations of these kinds unnecessary, and certainly without being absolutely sure of one's powers to preserve asepsis of the wounds the less they are handled the better. Major Smith gives as his opinion that amputation of a limb for simple uncomminuted fracture can scarcely ever be necessary, though it may be desirable on other grounds, connected with injuries of muscles, nerves, and arteries; most of his readers will, I think, agree with this proposition, and will possibly go a step further, and consider that the injury to these structures must be very severe to necessitate a primary amputation.

The author draws attention to Sir Thomas Longmore's directions on the subject of Examination of Wounds, written in 1877, and seems surprised that he was not more advanced in his views on the subject of antiseptic treatment on the battle field. To those who recollect hospital practice in those times, and remember the cumbersome paraphernalia of spray and dressings, it will not strike one as odd that Sir Thomas Longmore should have had doubts as to whether the antiseptic system as then practised was applicable to the battle field. It is the evolution of aseptic principles which

has permitted the astonishing results that the military surgeon of to-day is able to record. It must also be remembered, as the author recognises, that the modern bullet with its small opening, which is often almost closed by the elasticity of the skin and the early application of the first field dressing, are factors greatly in favour of asepsis. At page 53 the author discusses the advisability of keeping all fractures in the field hospital to which they are first admitted until union has taken place. He states that "he fails to see why it should be necessary to move such cases as much as was done in some parts of the theatre of war"; he goes on to say, "The craze for getting the front clear was a little overdone perhaps; but whether the same opinion would have held good if another big fight had caused a deluge of wounded for whom there would have been scant accommodation is another matter." One of the first principles of medical administration on the field seems to be that the field hospitals should be evacuated whenever it is possible, and we think that this principle is absolutely sound. If a field hospital is choked with sick and wounded it becomes immobile and useless for rapid movements. In South Africa perhaps the same necessity for clearing the front did not always exist, but in campaigns on the frontier of India non-attention to this principle would spell disaster, as far as the medical arrangements were concerned. Although we quite admit that it may be better for an individual case not to be moved, yet we think that individual cases must give way to the common good and to military exigencies. Besides, in case of a forward movement, one might be required to carry the case still further forward, and away from the place he must eventually reach, viz., the base.

Space will not allow us to enter more fully into a review of the work before us. We may, however, safely say that it is a little book that will quite repay perusal by military surgeons, who are naturally the most interested in the subject.

H. R. W.



Current Literature.

I.—MEDICINE AND SURGERY.

Tetanus Capitis.—A case of cephalic tetanus of unusual origin is reported by Schütze (*Deutsche Med. Woch.*, June 4, 1903). A woman, aged 58, was, on August 13, pecked on the forehead by a peacock, which also scratched the scalp and the right temporal region with its claws. There was considerable hæmorrhage from the frontal wound, which was arrested by bathing with arnica lotion and the application of pressure. Acute inflammatory symptoms followed, but subsided in a few days. On the third or fourth day after the accident the whole of the left side of the face became expressionless and the left eye could not be completely closed. On August 21 trismus appeared. A practitioner applied ointment to the wound and electricity to the left facial muscles. The trismus increased and deglutition became difficult. On September 9 she was admitted to hospital. There were retraction of the head, slight opisthotonos, and well-marked risus sardonius, extreme trismus, severe spasm of the muscles of deglutition, and left facial paralysis. The abdominal muscles and those of the limbs were unaffected, but there were no general tetanic spasms. Thus the symptoms were practically limited to the muscles supplied by the trigeminal and facial nerves, and this, coupled with the fact that the disease had already lasted four weeks, rendered the prognosis favourable. Two injections, each of 125 units of Behring's antitetanus serum, were given. The frontal wound was slightly to the left of the middle line. It was covered with a scab and showed no tendency to heal. On removing the scab a foreign body was found. It was the tip of the peacock's beak which had broken off in the wound. Under Schleich's infiltration anæsthesia the wound was thoroughly cauterised and packed with sterile iodoform gauze. The beak implanted under the skin of mice invariably produced death, with tetanic symptoms, and cultures of tetanus bacilli were obtained in grape-sugar-agar.

In spite of the difficulty in swallowing, the general condition of the patient was good. The temperature was normal, and the pulse was 80. The urine had no morbid constituents, and the internal organs were healthy. The trismus and facial paralysis slowly disappeared, the frontal wound healed, and she was discharged cured on October 2.

Diabetes and Fright.—A. Lorand reports two cases in which fatal diabetes followed nervous shock (*St. Petersburg Med. Woch.*, No. 22, 1903). The fact that violent emotion or excitement is occasionally followed by diabetes has long been recognised. Naunys, Senator and others, believe that for this to occur a hereditary predisposition must be present. However this may be, it is certain that an existing glycosuria is often aggravated by excitement. Thus Külz found that the assimilation of carbohydrates was diminished by emotion. A patient of the writer's had 0·3 per cent. of sugar in the urine when he heard he had lost half his fortune. The next day there was 5 per cent. Similar accidents, however slight, may cause

the percentage of sugar to rise. Spitzer reports a case of mild diabetes which had existed for years without a trace of acetonuria. The patient fractured his collar bone. Acetone and diacetic acid appeared and were rapidly followed by fatal coma. But diabetes may also follow injuries in previously healthy subjects. The prognosis of traumatic diabetes depends on the individuality of the patient. It is usually favourable in robust individuals of the working class, but is often bad in intelligent and well-educated subjects; in other words, it depends on the degree of nervous shock rather than on the severity of the accident. The prognosis is most unfavourable in women and children, in whom fright unaccompanied by injury is sufficient to produce severe diabetes.

(1) The wife of a barrister, aged 35, while bicycling, narrowly escaped collision with an electric tram. She rode home but felt exhausted. Five days later there were frequency of micturition and polydipsia. Nineteen days after the fright 7 per cent. of sugar was found. The sugar temporarily disappeared with a strict diet, but it re-appeared and was accompanied by acetone and diacetic acid. Death from coma occurred within a year. Though before the shock she appeared to be perfectly healthy the possibility that sugar was already present cannot be excluded with certainty, as the urine had never been examined. Her father had diabetes at 40 and died of pneumonia at 52.

(2) A girl, aged 16, was insulted and pursued by a man on a dark night. She escaped but reached home terrified. The next day she felt exhausted and experienced a dryness in the throat. Symptoms of dyspepsia appeared and were treated by a diet of fruit and milk. Six months later 8 per cent. of sugar was found in the urine. She was greatly emaciated and shortly died of diabetic coma. In this case also it was improbable that glycosuria had existed before the fright, as the patient was then in robust health. There was no hereditary predisposition.

A New Sign of Multiple Pregnancy.—A case is reported by Jentzer (*Zentralb. f. Gynäk.*, April 25, 1903) in which at the end of the eighth month of pregnancy the abdomen was extremely distended, and palpation consequently difficult. The foetal heart was equally audible on either side, but no difference in rate was perceptible. Above the symphysis two foetal heads could be felt, one of which could be displaced into the right iliac fossa the other into the left. If a hand was laid on each and they were suddenly approximated, a sensation was produced as when two billiard balls are sharply struck together under water. At term three living children were born, so that one was overlooked. This sign has not hitherto been described.

Urotropine as a Preventive of Typhoid Bacteriuria.—The importance of typhoid bacilluria consists in the fact that it may persist for months or even years after apparent recovery, during which time the patient is a centre of infection. If urotropine is given after the appearance of bacilluria the immediate effect is to cause a great reduction in the number or even apparent total disappearance of the bacilli. But according to Ernst Fuchs (*Deutsch. Archiv f. Klin. Med.*, Bd. lxxvi., 1-3 Heft, 1903), in cases in which no bacilli can be found bacterioscopically, numerous colonies are obtainable by cultures, and when the urotropine is discontinued, copious

bacilluria recurs. But though there exists no certain means of curing typhoid bacilluria when once established, it is possible by the administration of urotropine in the majority of cases to prevent its onset. Bacteriuria usually appears either shortly before or shortly after the patient becomes apyretic, though in rare cases it may appear early in the disease. Urotropine should be given in doses of 10 grains three times daily, as early as possible in the disease, and should be continued during convalescence until all chance of the occurrence of bacteriuria has passed. Thus urotropine was either not given at all or was given after the appearance of bacteria in the urine in 75 cases. In these there were 26 cases of bacteriuria, but in 14 coli bacilli, cocci, and other organisms were the cause. As bacteriuria not infrequently occurs in otherwise normal urine, in the latter cases it may have been an accidental complication. There remained 12 cases of genuine typhoid bacilluria, which occurred therefore in 16 per cent. of the 75 cases. But in 40 cases urotropine was given early as a prophylactic. In these only one case of bacteriuria occurred, although the urine was examined for some days after the treatment was suspended. In the one case of bacteriuria the disease was of unusual severity and the urotropine was not given till the twenty-seventh day. If it had been given earlier it might possibly have been successful.

Bilateral Facial Paralysis.—B. T. Twar (*Intercolonial Med. Journ. of Australasia*, April 20, 1903) relates the following unusual case of bilateral facial paralysis. A medical man, aged 25, complained of a stiffness of the right side of the neck, associated with slight pain, on February 27, 1902. The stiffness extended from the right mastoid eminence down to the shoulder and compelled him to flex his neck towards the right. On March 2, in addition to the stiffness, he complained of paroxysmal and shooting pain in the right ear, extending forwards towards the eye and backwards towards the external occipital eminence. On March 5 he awoke with the right side of his face paralysed; the paralysis was incomplete and more marked in the parts supplied by the cervico-facial division of the seventh nerve. It rapidly increased and was complete on March 7, the frontalis being the last muscle to become completely paralysed. He still complained of pain in the ear. On March 14 there were occasional fibrillar twitchings showing in the orbicularis palpebrarum and the orbicularis oris muscles. On March 15 there was some return of muscular movement on the right side of the face, but at the same time he began to complain of pain in the left ear, similar to that previously experienced in the right. The right side of the face rapidly improved, and by March 17 the power of movement seemed nearly complete, but *pari passu* with the return of muscular power on the right side the left became paralysed, the paralysis being preceded by a good deal of clonic contractions of the facial muscles, especially of the platysma. On March 17 he was unable to differentiate "tastes" with the anterior two-thirds of the tongue. This inability, however, quickly disappeared on the right side, but persisted on the left. The tongue also, which up to this time had been uniformly furred, became coated on the left, while the right side cleaned up, the line of demarcation (along the mid-line) being very clearly defined. On March 19 the paralysis of the left side of the face was complete, the frontalis again being the last to lose

power. On March 23 there was some return of muscular movement, appearing first in the parts supplied by the cervico-facial division. Concomitantly with this return of muscular movement the condition of the tongue and taste cleared up. The return of power was progressive, the parts supplied by the temporo-facial division, and especially the frontalis, being the last to regain power. By April 1 muscular power was approaching the normal, though somewhat marked by sluggishness of the orbicularis palpebrarum. Henceforward the progress to absolute normality was somewhat slower, but by the end of April muscular power was practically normal on both sides.

Pneumothorax from Exploratory Puncture of the Pleura.—

Ch. Mongour (*Gaz. Hebdom. des Sciences Méd. de Bordeaux*, June 21, 1903) reports the case of a man, aged 46, who had symptoms of left pleurisy. Puncture yielded yellowish fluid. Next day there was at the back of the right chest slight dulness and diminished vesicular murmur and vocal fremitus. As some doubts were felt as to the existence of a small effusion on the right side, exploration was performed with a No. 2 needle of Dieulafoy's aspirator. No fluid could be obtained, but scarcely was the needle withdrawn when there was an attack of suffocation. In a few minutes the patient became blue and passed urine involuntarily. Inhalation of oxygen and artificial respiration were without effect. The face became covered with a cold sweat. To relieve the patient, paracentesis was performed on the left side and about 400 gm. of fluid removed without benefit. M. Mongour argued that such a sudden and severe attack of dyspnoea could be due only to embolism or pneumothorax. For the former nothing could be done, therefore he made a supreme effort to relieve the latter. Without taking time to percuss he plunged a large trochar into the spot where he had explored with the needle. On withdrawing the trochar air escaped through the cannula with a whistle. Immediately the patient took long inspirations and in a few seconds he was resuscitated. By means of Dieulafoy's aspirator more air was removed until the pleural cavity was empty. Next day friction sounds were heard at the site of the double puncture. Death occurred three months later from pulmonary tuberculosis. Numerous cavities were found in both apices. The right pleural cavity contained no fluid and showed no adhesions. Pneumothorax from puncture of a pleura containing no fluid is very rare, though pneumothorax from paracentesis thoracis is well known. M. Mongour suggests that the needle pushed the lung away from the parietal pleura and that into the cavity so formed air entered during expiration. Perhaps at the point in question there were sub-pleural tubercles, which would favour the result. He does not think that the entry of air into the pleura was necessarily due to puncture of the lung. The prompt intervention evidently averted instant death. The lesson of the case is to prepare the practitioner for such a catastrophe. Otherwise he might be so embarrassed as to fail to recognise its nature and lose the opportunity of saving life.

Dermato-Myositis.—F. Forcheimer (*Boston Med. and Surg. Journ.*,

June 11, 1903) describes the case of a neurotic woman aged 40 who received a shock in June, 1901, became ill, and had irregular menstruation, con-

stipation, headache and pains in various parts. On August 20 she observed a pustule on the left leg where a garter had pressed. On September 8 there were in the left gluteal region an erythematous itching eruption and one pustule. Three pustules appeared in the ischio-rectal region, and a deep swelling, which did not yield pus on repeated incisions. The patient became emaciated, weak and depressed, with a temperature of 102° , and a pulse of 110. On the face was an erythematous rash and the region around the eyes was very puffy. The rash extended over the neck, chest and back. Hard œdema occurred in the skin over the right peroneus brevis. On October 28 the right thigh became œdematous and the rectus muscle became swollen over an area of the size of the palm. Respiration became painful from an inflammatory condition of the intercostal muscles. The œdema extended to the lower chest and abdomen. The general condition became worse; there was a temperature ranging between 100° and 102° , and the pulse was rapid and irregular. Furfuraceous desquamation of the affected skin occurred and was followed by pigmentation. In November she gradually began to improve. Convalescence was very slow and only in the autumn of 1902 could she walk with comfort. In March, 1903, there was still some pigmentation of the face, the affected muscles were still slightly tender, and movements requiring effort were clumsy.

Dermato-myositis was first described by Unverricht in 1887. He defined it as characterised by fever, enlarged spleen, œdema, acute myositis, and urticarial and erysipeloid eruptions. The muscles especially involved were those of the limbs and those of respiration and deglutition. Later he added, hæmorrhagic eruptions are of constant occurrence. Lorenz, who saw a larger number of cases, then extended the description. He described a prodromal period of several days, with malaise, rheumatoid pains, and an ascending type of fever reaching 104° . Then the cutaneous and muscular symptoms began. The œdema usually commenced on the face, especially on the eyelids. There were always profuse perspirations. The onset of the disease may be gradual or sudden, and the course acute, subacute, or chronic. The case described above is unusual in the presence of the pustules and in the absence of sweating. The etiology and pathology are not understood.

Injuries to the Child's Head during Labour.—R. Jardine (*Journ. of Obst. and Gynecol.*, June, 1903) finds that in the Glasgow hospitals cranial depressions produced during delivery are not uncommon. As a rule they are produced in contracted pelvis by pressure of the promontory, but he has seen two cases in which the pelvis was normal. In one the right frontal and parietal bones were deeply furrowed. The child was very large and was delivered with forceps. In the second case the depression was at the back of the right parietal bone and was probably caused by pressure of the ischial spine. It disappeared. As a rule the frontal bone has been the one affected, but in several cases the parietal was depressed after breech delivery. In two of these which were followed up the depressions have risen, but after three years are still traceable. Dr. Munro Kerr has shown that a cranial depression may be raised, like a depression in a bowler hat, by applying pressure in a diameter at right angles to the depression. This simple procedure should be first tried. If it fails Dr. Jardine recommends

that the bone be cut down upon and raised at once. The following case is an example. A small rickety woman with a diagonal conjugate of four inches was delivered by forceps after considerable traction. A thud was heard as the head passed the promontory. There was a marked depression of the frontal bone, but the child seemed to suffer no inconvenience from it. At the age of twelve days Dr. Jardine reflected about an inch of scalp from the back of the frontal bone, made an incision through the bone about a quarter of an inch in front of the suture, passed McEwen's periosteum elevator between the dura mater and the bone, and raised the depression. There is still slight flattening of the bone, but the arch is gradually rising. Other head injuries which may occur during labour are cortical and meningeal hæmorrhage, traumatic keratitis, hæmorrhage into the optic nerve, retina, or anterior chamber of the eye. In difficult deliveries with forceps the eye has been enucleated. "Traumatic keratitis in the new-born" has only recently been described. The first case was observed at the Glasgow Maternity Hospital on January 21, 1901. A few hours after delivery with Milne Murray's axis traction forceps the house-surgeon noticed, in addition to some bruising of the right temple and upper eyelid, where the blade of the forceps had been applied, that the cornea was more or less opaque. Since the discovery of this case a watch has been kept for others, and six have been discovered. Dr. W. Ernest Thomson, who examined the cases, has published a paper on them in the twenty-second volume of the *Transactions of the Ophthal. Soc.* The following is taken from his description of the case mentioned above: On January 23 the right cornea was hazy to the extent of making observation of the pupil difficult. The opacity gradually diminished, but when the child was a year old was still distinct. Treatment consisted in the use of yellow oxide of mercury ointment.

II.—HYGIENE AND PATHOLOGY.

The Nature of the Salts in Certain Indian Soils.—Many of us are familiar with certain barren tracts in Upper India, characterised by the presence of a whitish or grey efflorescence on the surface. These lands, extending over an area of more than two million acres, principally in the Punjab and between the Jumna and the Ganges, contain so large a quantity of soluble salts in the soil that agriculture is practically impossible. The reclamation of this land has occupied the attention of the Government of India for many years, but little effort has been made to utilise the soluble salts. Such lands, known in the vernacular as *usar*, have the following features: The soil is impermeable for a varying depth below the first few inches; below the impermeable layer is a coarser stratum, more or less porous, in which nodular limestone is generally found, and this is sometimes so thick and continuous as practically to form a rock (Kunkar). The upper soil layers are thus shallow and fitted for the concentration in them of soluble salts. Such land varies in appearance according to its humidity and the amount of salts which it contains, but its dominant superficial appearance is the white or grey efflorescence already mentioned. An interesting account of the various attempts which have been made to utilise *usar* land has been given by W. H. Moreland in the *Indian Agricul. Ledger*, No. 13, 1901, but few analyses of the soluble salts contained in these soils have been recorded,

and no attempts have been made to extract these substances or employ them commercially on any large scale. Few of these soil samples contain less than 89 per cent. of sodium carbonate, but the percentage of salt in the soil varies very materially according to the district and the subsoil. In the districts where there is a considerable quantity of alkali in the soil the upper layers are collected and sold under the name of *sūjji mūtti*. This is in considerable demand among the native washermen who use it in place of soap, and in Allahabad there certainly exists a firm which makes a crude soap by boiling the washings of the earth with lime and castor oil. Glass is also made by natives from this sodium carbonate, the chief product being the glass bangles which are so common in India. Sodium hydroxide has also repaid enterprise for its manufacture, especially in the vicinity of paper mills. Notwithstanding these facts, it is curious to note that both sodium carbonate and sodium hydroxide are largely imported into India; the former especially being employed in the aeration of mineral waters.

From a chemical point of view it is obvious that this soil is of considerable interest, and certain instructive analyses of various samples have been made by Hill in *Proc. Chem. Soc.*, vol. xix., No. 262, p. 58. Each sample of earth was digested with hot water several times and the solution filtered. In each case the light brown solution thus obtained yielded on evaporation large and well-defined crystals of the deca-hydrated normal carbonate, but fractional crystallisation gave a few mono-clinic crystals imbedded in the solid mass produced by slowly evaporating the third fraction. These became opaque on being scratched and were efflorescent. The solution, which contained a considerable amount of humus, was evaporated to dryness, the residue being further dried until the weight was constant. The combustion of 0.3892 gramme of this dried residue gave 0.0278 CO_2 and 0.0078 H_2O , with a residue of 0.3584 Na_2CO_3 . The loss in the dried sample was thus 0.0308 gramme. Hill assumed that humus is half the weight of the CO_2 derived from it, and that the difference between the gain in the absorption tubes and the loss in the combustion boat represented oxidation of humus, or 0.0048 gramme of humus representing 0.0096 gramme of CO_2 due to humus. The remaining 0.0182 gramme of CO_2 , Hill deemed to be due to decomposition of the sesqui-carbonate of sodium, representing 0.1133 gramme of sesqui-carbonate, or 29.9 per cent. on the dried salt. The analyses of five samples gave the following percentage compositions:—

SAMPLE	A	B	C	D	E
Percentage of soluble salts	6.3	3.1	16.6	6.3	6.5
Na_2CO_3 ...	95.63	95.08	88.90	94.38	94.80
NaCl ...	3.39	4.40	1.20	1.21	1.75
Na_2SO_4 ...	—	—	9.34	4.12	3.02
P_2O_5 ...	0.56	0.45	0.38	0.35	0.64
Al_2O_3 ...	0.31	0.12	0.12	trace	trace

The Incidence of Venereal Disease in the Army.—The recent issues of the report of the Army Medical Department and that of the Sani-

tary Commissioner with the Government of India, both dealing with the health of the Army during the year 1901, are not altogether reassuring as to our means of control over this class of disease among soldiers. If we take all forms of venereal disease together, the admissions in the United Kingdom numbered 10,631, and the constantly sick 918. The total ratio of admissions for venereal diseases was 105 and that of constantly sick 9 per 1,000 of strength, being higher than the preceding year's ratio by 12 and 2, but lower than the average of the preceding ten years by 52 and 4 per 1,000 respectively. The increase appears to have been most manifest in the Salisbury Plain, Belfast and North-Eastern Districts; the individual garrisons which show the highest admission ratios being Leeds, Ballykinler, Belfast, Bradford, Dublin, Bodmin, London and Devonport, all of which show ratios varying from as much as 480 to 213 per 1,000 of strength. Among the colonial garrisons, the disease was most prevalent in Barbadoes, China and Jamaica, where the admission ratios were respectively 282, 260, and 198. In India there was some improvement in the admission ratio among European troops, the actual ratio per 1,000 being 276, which is 22 lower than in 1900, and 152 below the rate for the preceding ten years. In spite of this fall, these figures mean a considerable loss to the State, for it involved a total loss of 516,855 days off duty, or, put in another way, there were 1,416 men constantly sick from the effects of venereal disease. The average stay of each case in hospital was 30.79 days. Several causes have been at work in bringing about this reduction in the prevalence of venereal disease in India, the chief being the increased age of the soldier and a longer residence in the country, both arising from a smaller number of new arrivals as regimental drafts. Other causes have been said to be a better working of the cantonment hospitals and a more rigid enforcement of the powers conferred by the Cantonment Code for dealing with persons known to be suffering from contagious diseases. Unless the zeal and initiative of those administering the cantonment hospitals and Code in India have materially altered during the last few years, as compared with our own experience in that country, we question whether the slight amelioration in venereal disease incidence in India which is reported can be legitimately credited to these causes. For our own part we are disposed to think that the efficient factors contributing to this reduction are a greater interest taken in the matter by officers generally, the provision of means of ablution in barracks and the encouragement of their use, lectures on temperance and continence, the fostering of athletics among the men, the imposing of disciplinary restrictions on soldiers constantly admitted to hospital for venereal disease, and the placing of certain localities out of bounds. Excellent as are these measures their value is minimised by the lack of consistent and general application; every garrison and every unit in each garrison does not carry them out; their application and development is casual or haphazard, and dependent rather upon the whim or zeal of individual officers than on the routine observance of instructions from a central authority intended for universal application. We doubt whether the regrettable incidence of venereal diseases among European troops in India can ever be permanently controlled without the development and systematic application of an official policy directed to that end. We are not without hope that a policy of this kind, based upon an appreciation of epidemiological facts and conceived in the best interests

of the State, will soon be inaugurated. In dismissing this topic we note with pleasure that the admission rate for these diseases amongst native troops in India was but 34 per mille.

Morphology of the Diphtheria Bacillus.—The property which the Klebs-Löffler bacillus possesses of presenting itself under a variety of forms is well known. In a recent paper (*Journal of Medical Research*, Boston, March, 1903) Denny points out that the *Bacillus diphtheriæ*, the *Bacillus pseudo-diphtheriæ* and the *Bacillus xerosis* are similar in young cultures, but that in older cultures differences are seen. The first-named has a more marked development as a higher form, showing barred, clubbed and filamentous forms, with, occasionally, true branching. The pseudo-bacillus has no such development, but the *B. xerosis* takes on a higher development, as shown by the breaking up of the protoplasm into segments. He suggests that both *B. xerosis* and the *B. diphtheriæ* have developed by evolution from the simpler form of the pseudo-bacillus; or possibly this latter represents a reversion from a higher type.

The same subject is discussed by Concetti (*Annali d'Igiene Sperimentale*, vol. xi., fasc. iii., p. 79), who, by varying the culture medium employed and the conditions of growth, succeeded in procuring from bacilli, clavate in outline and not uniformly stained, certain intermediate types, finally arriving at that assumed by the well-known Klebs-Löffler bacillus. The author's investigations go to show that not only are the actinomycotic forms and the usual appearances of the diphtheria bacillus convertible the one into the other, but that these different forms of the same micro-organism have a varying intensity of action in the production of diphtheria. The so-called clavate large bacilli would seem to represent the maximum development of the micro-organism, and with this extreme limit of cultural development is associated a minimum toxicity. In proportion as the form of the micro-organism approaches that of the small Klebs-Löffler bacillus, so does its toxicity increase. Concetti further points out that the large clavate forms of the bacillus represent the parasitic aspect of the micro-organism and have a parallel in the case of the tubercle bacillus. The author urges that attention should be devoted to the forms of the diphtheria bacillus which exist as saprophytes, notably those which resemble the actinomyces and which are not uncommon in the air, soil and digestive or respiratory tracts. Without accepting altogether the conclusions of the author, we must admit the suggestiveness of his facts and theories. It is more than probable that certain forms of the diphtheria bacillus can, under favourable conditions, be transformed into those which are highly infective. By researches on these lines the explanation of some difficult epidemiological facts might be forthcoming, especially the spontaneous outbreak of diphtheria, and apart from any apparent focus of infection.

Experimental Cancer.—A valuable contribution to the question of cancer causation is made by Jensen in the *Centralb. f. Bakt.*, Bd. xxxiv., Hft. 1 u. 2, 1903, in which he records certain experiments as to the transplantation of malignant growths. Pieces of a small carcinoma in the back of a white mouse were broken up in a mortar with sterile salt solution, and a small amount of the emulsion injected subcutaneously into five mice;

in three of these, subcutaneous tumours developed similar in structure to the original growth. From two of these mice further transplantations were made, and up to the end of last year no less than 844 mice had been thus inoculated. Of these 232 died within a fortnight of the inoculation; of the remainder, 274 had been injected with tumour material rubbed up with salt solution, and in 121 of them tumours developed; in the 338 others, a small piece of growth was inserted beneath the skin and in 128 cases growths developed. Thus about half of the inoculated animals gave positive results. It is interesting to note that the inoculated material underwent marked diminution during the first few days after transplantation, subsequently gradually growing until in a few cases it was as large as the animal itself. No metastases were formed. An important factor in respect of success was the condition of the transferred material; the greater effects were always obtained from young and small growths. A variety of circumstances seem to cause negative results, the more important being the action of bacteria in setting up concurrent inflammatory processes at seat of inoculation, and the existence of immunity to the new growth possessed by some animals. Those which were negative to first injections were also negative to further inoculations. Whole families of mice showed this immunity at times. Successful inoculation from white to grey mice was difficult to secure, but from a positive grey case further transplantations to grey mice were more successful. Negative results followed injection into four other species of mice, into rabbits, guinea-pigs, rats, ducks and goats. Careful and daily examinations of the development of the growths in a series of animals showed that the new formation was caused by a multiplication of certain transplanted cells, and that the new growth was a true transplantation. A variety of pseudo-parasitic forms were seen in the new tumour formations and also some apparent blastomycetes, but no cultures of blastomycetes were obtained. Some interesting facts as to the vitality of the tumour cells under a variety of conditions are recorded by Jensen. If kept at body temperature in state of isolation the cells retained their vitality for only twenty-four hours; a low temperature of 1° to 3° C. increased their resistance. A five minutes' exposure to 47° C. or to 20° C. killed the cells. Bright sunshine also killed them, but the light rays appeared to have only a superficial action. Desiccation and 0.25 per cent. of phenol were both capable of devitalizing these cells within five minutes. These experiments are by no means conclusive, but they constitute an important step in support of Ribbert's original contention as to the causation of tumours, and indicate that it is from experimental work that the elucidation of the etiology of carcinoma is to be looked for.

The Micro-organism of Syphilis.—In the *Dermatologische Zeitschrift* for August, 1903, Max Schüller contributes a further note on the parasite of syphilis. He describes a protozoon-like organism which he states he has found in early and favourable cases, occupying spaces in the connective tissue of a Hunterian chancre, in the scab covering a chancre of the upper lip, in a syphilitic inguinal gland, and on one occasion in a gumma of the scalp. Using a double stain of Bismarck brown and indigo-carmin, the connective-tissue cells are stained brown and the spore capsules blue. The latter consist of a rounded body having a double cell wall and con-

taining large granules. These latter may escape through the unbroken cell wall or after rupture of the latter, and exhibit active movements. Schüller says that he has succeeded in cultivating these organisms on fresh warm blood, the temperature of which must not be allowed to fall below 35° C., as at a lower temperature all growth ceases. The article is well illustrated, showing these bodies in different stages of development. C. E. P.

The Parasite of Yellow Fever.—The important announcement is made in *Bulletin No. 13* of the Yellow Fever Institute, of the discovery of the probable parasite of yellow fever. The investigators were Drs. Parker, Beyer and Pothier of the Marine Hospital Service in Vera Cruz, in association with Drs. Matienzo, Del Rio, and Iglesias, members of a Commission appointed by the Mexican Government. A non-immune from a mountain village, who had never visited the coast before and who for the preceding two years had been in gaol, was examined and found free from organic disease. The urine and blood of this man were absolutely negative. On September 4, 1902, two mosquitoes which had fed on a patient ill with yellow fever on August 13, were permitted to bite his hand. Seventy-four hours later yellow fever developed. On September 8 fresh mosquitoes were allowed to feed on this man's hands. The mosquitoes whose bites produced the disease showed, on microscopical examination, in their salivary glands certain spores filled with sporozoites in various stages of maturation; while the mosquitoes infected by feeding upon the patient showed, on the fifth day after feeding, in the stomach and œsophageal diverticulum, small fusiform protozoa, mostly in groups, though also single, which bore a striking resemblance to the terminal conjugation stages of certain sporozoa. These bodies, according to the authors, pass into the œsophageal diverticulum after conjugation, and there undergo further development in connection with another body of unknown origin and nature. Increasing in size, the nucleus undergoes fragmentation or multiplication, while the resulting chromatophile granules increase rapidly in size, become sharply defined and less regularly oval and forming sporoblasts. These last are liberated later, and, passing to the anterior end of the diverticulum, penetrate the delicate connective tissue septum into the salivary gland, the cells of which they enter. In these cells the sporoblasts break up into resting spores which ultimately find their way into the lumen of the gland ready for discharge. From such infected mosquitoes the authors produced yellow fever in man, and from other mosquitoes which had fed on these cases they recovered the same micro-organism as described. They further go on to say: "We permitted this same species of mosquito, *Stegomyia fasciata*, to feed on a case of malarial fever of the malignant quotidian type, on normal blood and on sugar and water. In none of these mosquitoes did we find the parasite." To this parasite they give the name *Myzococcidium stegomyiæ*. It would seem from what these authors say that the presence of the parasite modifies the life processes of the mosquito. Whereas in normal mosquitoes feeding on proteid food, which is necessary for ova development, the ova undergo hypertrophy, in the infected mosquitoes the ova atrophy after a short primary hypertrophy. The authors believe that this atrophy alters the instinct of the insect and tends to preserve its life for some time by suspending the process of ovipositing.

The authors further give some interesting information concerning the habits of the yellow fever mosquito, as the result of their studies in Vera Cruz. The *Stegomyia fasciata*, being a purely domestic form of mosquito, finds natural breeding places in the various receptacles for water in and around houses. The insect deposits from 40 to 150 eggs, which mature in ten or twelve days. If the water in which the larvæ and pupæ live be agitated, the insects immediately fly to the bottom, so that nearly all the water can be dipped or poured out without getting any insects. Indeed, they say a barrel may be turned on its side and yet 80 per cent. of the larvæ remain in the last few ounces. The larvæ are said to be quickly killed by being turned out of water on to the ground. The *Stegomyia* is essentially a day-flying mosquito, but endowed with special insidiousness and pertinacity in attacking man. The species is probably more widely distributed than any other throughout tropical and sub-tropical America. Formerly supposed to be a coast form, it has spread inward along lines of commercial communication and has actually followed two railroads to altitudes of 3,000 and 4,500 feet; yellow fever has simultaneously followed it into this new ground. The authors found the mosquitoes breeding in water on a variety of ships. While many foreigners and better-class Mexicans succumb to yellow fever, the principal source of infection is the mountain Indian who, coming into the towns, sleeps either in the streets or in one of the large native boarding houses which are rarely free from infected mosquitoes.

Corps News.

EXTRACTS FROM "LONDON GAZETTES."

ARMY MEDICAL STAFF.

Surg.-Gen. W. S. M. Price is placed on retired pay, dated August 11, 1903.

Surg.-Gen. W. S. M. Price entered the Service on September 30, 1864, as a Staff Assist.-Surg. He was appointed Surg. to the 73rd Foot, April 11, 1865, and Surg. Army Medical Department, March 1, 1873. Was promoted Surg.-Major, September 30, 1876; Brig. Surg.-Lieut.-Col., November 7, 1889; Surg.-Col. A.M.S., and Col., February 27, 1895, and Surg.-Gen. December 1, 1898.

He served in the Afghan War, 1878-80, operations in the Bazar Valley, affair of Deh Sarak—Medal; Soudan Expedition, 1884-5; Nile, with Korti Field Hospital—Medal with clasp, bronze star.

Surg.-Gen. Price has been an Honorary Surgeon to the Viceroy and Governor-General of India since January 1, 1900, and was appointed Principal Medical Officer, H.M. Forces in Bombay, June 16, 1899.

Surg.-Gen. Sir W. D. Wilson, K.C.M.G., is continued on the Active List as a supernumerary to the establishment, under the provisions of Article 473 of the Royal Warrant of October 26, 1900.

Surg.-Gen. T. Tarrant, retired pay, late Army Medical Staff, to be an Honorary Physician to His Majesty, *vice* Surg.-Gen. A. H. Fraser, retired pay, deceased, dated September 9, 1903.

Surg.-Gen. Tarrant entered the Service on June 16, 1854, as a Staff Assist.-Surg., being transferred to the Royal Artillery on July 28, 1855. Appointed Surg. on the Staff July 16, 1866; transferred to Cape Mounted Rifles September 14, 1866, and to the 12th Lancers December 29, 1869. Was promoted Surg.-Major, March 1, 1873; Brig.-Surg., November 27, 1879; Deputy-Surg.-Gen., June 1, 1883, and Surg.-Gen., October 25, 1889. He retired from the Service November 13, 1890.

He served in the Crimean Campaign, 1854-5, siege of Sebastopol—Medal with clasp, Turkish medal. Indian Mutiny, 1857-8, battle of Cawnpore, action of Kala Nuddee, and affair of Kankur—Medal. South African War, 1878-9, Zulu campaign, battle of Ginginhlovo. Despatches *London Gazette*, May 7, 1879. Medal with clasp.

ROYAL ARMY MEDICAL CORPS.

Col. R. Exham, C.M.G., retires on retired pay, dated August 19, 1903. This officer entered the Service as a Staff Assist.-Surg., April 1, 1871, and was appointed Assist.-Surg., 6th Foot, December 2, same year. He was promoted Surg., March 1, 1873; Surg.-Major, April 1, 1883; Surg.-Lieut.-Col., April 1, 1891. He held the local rank of Colonel in South Africa whilst serving as P.M.O., Natal Field Force. He was gazetted Colonel R.A.M.C., November 28, 1899. Col. Exham was Secretary to the P.M.O., India.

He was specially mentioned for his services whilst engaged in the Boundary Commission in Bulgaria.

His war services were as follows: South African War, 1899-1901; P.M.O. Natal Field Force and Section Lines of Communication; defence of Ladysmith; operations Orange River Colony, November 30, 1900, to November, 1901. Despatches, *London Gazette*, February 8, 1901 (Sir G. S. White, December 2, 1899, and March 23, 1900), and *London Gazette*, September 10, 1901.

He was awarded the C.M.G. for services in South Africa.

Major R. J. McCormack retires on retired pay, dated August 19, 1903. He entered the Service as Surg. on August 2, 1884, and was promoted Surg.-Major, August, 2 1896. He served in South African War, 1899-1902. He acted as P.M.O. at the base, Durban. He was mentioned in despatches (Sir R. H. Buller, March 30 and November 9, 1900), *London Gazette*, February 8 and April 16, 1901.

Capt. P. J. R. Nunnerley, from half-pay is placed on retired pay, dated July 26, 1903. He entered the Service as Surg., August 1, 1885, and was placed on temporary half-pay on account of ill-health, July 16, 1898.

Col. William McWatters retires on retired pay, dated August 26, 1903. He entered the Service as Staff Assist.-Surg., October 2, 1865, and was appointed Assist.-Surg. 86th Foot, August 7, 1866. He was promoted Surg., March 1, 1873; Surg.-Major, October 2, 1877; Surg.-Lieut.-Col., October 2, 1885; Brig.-Surg.-Lieut.-Col., December 16, 1891; and Surg.-Col., May 7, 1896. His War services were: Afghan War, 1878-80—Medal. Hazara Expedition, 1891—mentioned in despatches, *London Gazette*, October 20, 1891.

Major G. T. H. Thomas retires on retired pay, dated August 26, 1903. He entered the Service as Surg., February 3, 1883; he was promoted Surg.-Major, February 3, 1895.

He was in the South African War, 1899-1902, and took part in the operations in Cape Colony, south of Orange River, including the actions at Colesberg (January 15 to February 12, 1900). He also took part in the operations in Orange River Colony, July, 1901, to May 31, 1902. Queen's medal with two clasps; King's medal with two clasps.

Capt. G. E. Hughes retires from the Service, receiving a gratuity, dated August 26, 1903. He entered the Service as Surg.-Lieut., January 30, 1892, and was promoted Surg.-Capt., January 30, 1895.

Lieut. W. C. Stevenson resigns his Commission, dated August 26, 1903. He entered the Service June 27, 1901. He served in the South African War, 1902.

Lieut.-Col. F. A. Harris, from half-pay, retires on retired pay, dated September 9, 1903. He entered the service as Surg., February 5, 1881, and was promoted Surg.-Major, February 5, 1893, and Lieut.-Col., R.A.M.C., February 5, 1901.

His War services were as follows: Egyptian Expedition, 1882—Medal, bronze star; South African War, 1899-1900; advance on Kimberley, including actions at Belmont, Enslin, Modder River, and Magersfontein; operations in the Transvaal, west of Pretoria, July to November, 1900; operations in Orange River Colony, May to July, 1900, including actions at Lindley and Rhenoster River—Queen's medal with four clasps.

Capt. R. T. Brown, from half-pay, to be Capt., with precedence next below H. E. Weston, dated August 12, 1903.

Lieut.-Col. W. L. Chester to be Colonel, *vice* Col. R. Exham, retired, dated August 19, 1903.

This officer entered the Service as Surg., Army Medical Department, March 31, 1875; promoted Surg.-Major, March 31, 1887; Surg.-Lieut.-Col. A.M.S., and Lieut.-Col. Royal Army Medical Corps, March 31, 1895; being advanced to Lieut.-Col. under Article 365 of the Royal Warrant, August 3, 1898.

He served in the South African War, 1881, Transvaal campaign; Soudan Expedition, 1884-5, Nile—Medal with clasp, bronze star.

Lieut. R. B. Black is seconded for service with the Egyptian Army, dated August 13, 1903.

The date of the retirement on retired pay of Lieut.-Col. M. D. O'Connell is August 15, 1903, and not as stated in the *London Gazette* of August 14, 1903.

The undermentioned Majors to be Lieut.-Cols., dated August 4, 1903:—

E. H. L. Lynden-Bell, J. Riordan, R. H. Firth, R. H. H. Moore, A. E. Tate, C. E. Faunce, H. J. Wyatt.

Major E. J. Lawless, on having relinquished his temporary commission for service in South Africa, is granted the honorary rank of Major in the Army, with permission to wear the uniform of the Corps, dated August 7, 1902.

Lieut.-Col. J. C. Dorman, C.M.G., to be Col., *vice* Charlton, promoted, dated August 11, 1903.

Lieut. W. F. Ellis from the seconded list to be Lieut., dated August 26, 1903.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Lieut. H. Fox is seconded for service under the Foreign Office, dated August 13, 1903.

ARMY MEDICAL RESERVE OF OFFICERS.

Surg.-Lieut. William H. Vickery to be Surg.-Capt., dated September 12, 1903.

The promotion of Surg.-Lieut.-Col. E. Luke Freer, V.D., is antedated to December 24, 1899.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

The London Companies.—Lieut.-Col. J. E. Squire, M.D., is granted the honorary rank of Col., dated August 29, 1903.

The Manchester Companies.—Lieut. R. W. B. March to be Capt., dated September 9, 1903.

The following announcement is substituted for that which appeared in the *London Gazette* of June 26, 1903, under the heading "Gordon Volunteer Infantry Brigade Bearer Company" :—

The Aberdeen Company.—The undermentioned gentlemen to be Lieuts. :—

James Smart, dated June 27, 1903 ; John Wallace Milne, dated June 27, 1903.

The transfer of Lieut. F. Kelly from the Royal Army Medical Corps (Volunteers), the Aberdeen Company, to the Gordon Volunteer Infantry Brigade Bearer Company, which was announced in the *London Gazette* of August 14, 1903, is cancelled.

The Woolwich Companies.—Lieut. A. H. Minton to be Capt., dated September 12, 1903.

VOLUNTEER CORPS.

1st Nottinghamshire (Robin Hood).—Surg.-Lieut. G. T. D. Elder resigns his Commission, dated August 29, 1903.

4th Volunteer Battalion the Queen's Own (Royal West Kent Regiment).—Frederick Borroughs Jefferiss, Gent., to be Surg.-Lieut., dated July 11, 1903.

4th Durham Royal Garrison Artillery.—Surg.-Lieut. Henry William Martyn Storer resigns his Commission and is appointed Second Lieut., dated September 5, 1903.

3rd (Cambridgeshire) Volunteer Battalion the Suffolk Regiment.—Surg.-Lieut. F. A. Wagstaff to be Surg.-Capt., dated May 14, 1903.

The announcement which appeared in the *London Gazette* of June 26, 1903, is cancelled, and the following substituted :—

Capt. F. E. A. Webb, from the Harwich Volunteer Infantry Brigade Bearer Company, is re-transferred as Surg.-Capt. (Supernumerary), dated June 27, 1903.

1st Volunteer Battalion the Gordon Highlanders.—Surg.-Lieut. J. F. Christie to be Surg.-Capt., dated September 9, 1903.

7th Middlesex (London Scottish).—Surg.-Capt. J. Cantlie to be Surg.-Major, dated September 9, 1903 ; Surg.-Lieut. G. C. Cathcart to be Surg.-Capt., dated September 9, 1903.

19th Middlesex (Bloomsbury).—William Francis Roe, Gent., to be Surg.-Lieut., dated September 9, 1903.

1st Lancashire Royal Engineers (Volunteers).—Surg.-Lieut. H. Halton to be Surg.-Capt., dated September 12, 1903.

MEMORANDUM.⁷

[The grant of the temporary rank of Surg.-Capt. in the Army to Surg.-Capt. (temporary Surg.-Lieut. in the Army) H. N. A. Taylor, 3rd Volunteer Battalion the Essex Regiment, which was notified in the *London Gazette* of May 8, 1903, bears date December 30, 1902, and not as therein stated.

VOLUNTEER INFANTRY BRIGADE BEARER COMPANIES.

West Kent.—The announcement of the appointment of Frederick Burroughs Jefferiss, which appeared in the *London Gazette* of August 4, 1903, is cancelled.

Sussex and Kent.—Lieut. H. G. Mallam to be Capt., dated August 29, 1903.

Worcester and Warwick.—Lieut. A. R. Badger to be Capt., dated September 9, 1903.

5th London.—Surg.-Capt. W. N. Evans, from 1st London Volunteer Infantry Brigade Bearer Company, to be Capt., dated September 12, 1903.

His Majesty has been graciously pleased to approve of the following Volunteer Infantry Brigade Bearer Companies being formed into independent units :—

The Bedford ; the 3rd London.

THE SOKOTO EXPEDITION.—We are glad to see, by the *London Gazette* of September 11, that the King has been pleased to approve of the grant of the medal for Distinguished Conduct in the field during the recent military operations in the

Kano-Sokoto country in West Africa to Staff-Sergt. G. C. W. King, of the Royal Army Medical Corps.

EXTRACTS FROM ARMY ORDERS.—A.O. 158 instructs that a soldier reporting himself sick who, in the opinion of the medical officer, is temporarily unfit for the performance of all his duties, but for whom treatment in hospital is not essential, will be ordered to attend at the hospital or inspection room at such times and for such period as the medical officer may consider necessary. While a soldier is attending hospital his commanding officer, acting on the recommendation of the medical officer, will relieve him from all duties, or employ him on such duties and fatigues in barracks as he is capable of performing. While attending hospital a soldier will not be permitted to leave barracks nor will he be admitted to the canteen, either while attending hospital or while a convalescent on light duty, unless the written permission of the medical officer has been given. The King's Regulations and the Medical Regulations will be amended in accordance with this Army Order.

A.O. 163 intimates that an officer who is entitled to the free use of a public charger under A.O. 1 of 1903, but who on the date of the promulgation of that Order was in possession of a private charger, will be allowed compensation at the rates authorised by the Allowance Regulations, in addition to being granted the use of a public charger if the private charger is lost before January 1, 1904, under any of the circumstances specified in paragraph 540 of those regulations.

A.O. 166 lays down that the following will be substituted for paragraph 463 of the Regulations for Medical Services as amended by A.O. 18 of 1902. Thus paragraph 463 will read: A soldier, not below the rank of sergeant, who incurs such loss of teeth as would otherwise cause his discharge as an invalid, may be provided with artificial teeth at the public expense, if, in the opinion of the medical officer, he will thereby be rendered efficient. Paragraph 463a will read: A soldier who, as the result of wound, injury or disease, directly attributable to active service, incurs such loss of teeth as to render him inefficient may, on being invalided, be provided with artificial teeth at the public expense. So, too, paragraph 463b will be to the effect that a soldier who as the result of wound or injury, directly attributable to active service, incurs loss of teeth not sufficient to render him inefficient may be provided with artificial teeth at the public expense.

A.O. 168 intimates that Army Form I. 1236, "Mobilisation Bearer Company, Proceedings of Board of Survey on Field Medical Equipment (Old Pattern)," is cancelled.

THE RECENT EXAMINATION FOR PROMOTION.—The following results are notified of the examination qualifying for promotion to the rank of Major:—

Awarded a 2nd Class Certificate, and therefore eligible for six months' acceleration in promotion: Capts. Mangin (*C*), Pollock (*D*), Taylor (*D*), Longhurst (*E*), Fowler (*C*), Keble (*G*), Fleury (*D*), Thom (*K*), and Grech (*D*).

Awarded a 3rd Class Certificate, and therefore eligible for three months' acceleration in promotion: Capts. Samman (*F*), French (*H*), Williams (*G*), McMunn (*I*), Prynne (*C*), Barnett (*J*), Fox (*G*), Green (*G*), Tibbits, Profeit (*L*), Kiddle (*C*), Cooper and Hooper.

The following passed, but did not qualify for special certificate: Capts. Killery, Boyle (*D*), Berryman (*D*), and Heaton (*L*).

The letters shown in brackets against some of the above names indicate the officer as having qualified as specialist in one of the following subjects: thus, Ophthalmology (*C*), Skiagraphy (*D*), Dental Surgery (*E*), Psychology (*F*), Gynaecology (*G*), Dermatology (*H*), Specific Fevers (*I*), Pediatrics (*J*), Otology (*K*), and Laryngology (*L*).

ARRIVALS HOME.—The following officers have arrived home: Lieut.-Col. J. J. R. Lucas, Capt. P. S. O'Reilly, Major O. R. A. Julian, C.M.G.

POSTINGS.—The following postings to Stations have been [made:—

Lieut.-Col. W. J. Macnamara, Jersey.

Lieut.-Col. T. J. O'Donnell, D.S.O., N.W. District.

Majur A. de C. Scanlan, Aldershot.

Major C. H. Hale, D.S.O., West District.
 Capt. R. T. Brown, Salisbury Plain.
 Capt. A. C. Lupton, Home District.

EMBARKATIONS.—Captain H. E. M. Douglas, V.C., D.S.O., to Somaliland.
 Major E. Davis, Capt. W. C. Croly, Lieut. F. A. H. Clarke, to India.

EXCHANGES.—The following exchanges on the roster for service abroad have been permitted :—

Majors G. E. Hale, D.S.O., and A. C. Ferguson, C.M.G. ; Majors A. O. Fitzgerald and G. F. H. Marks ; Lieut.-Cols. W. J. Macnamara and R. Porter ; Majors C. E. Moffat and S. J. W. Hayman.

THE CORPS WAR MEMORIAL FUND.—Some months before the termination of hostilities in South Africa it was decided that a Memorial should be erected to all ranks of the Royal Army Medical Corps who fell in the South African Campaign. With this object, after consultation with the Director-General of the Army Medical Service, a provisional Committee was formed in South Africa to consider the question generally, and the recommendations of this Committee were forwarded to the Principal Medical Officers of all Districts at home and abroad, with a request that they would arrange for the collection of subscriptions which Messrs. Holt and Co. had kindly consented to receive. On October 8, 1902, a general meeting of the subscribers to the Fund so established was held at 18, Victoria Street, S.W., Sir W. Taylor, K.C.B., being in the chair. A Committee was elected, consisting of the following officers, all of whom had served in South Africa : President, Sir W. D. Wilson, K.C.M.G., late Principal Medical Officer of the South African Field Force ; Col. W. L. Gubbins, M.V.O., Lieut.-Col. W. Babbie, V.C., C.M.G., Lieut.-Col. R. J. S. Simpson, C.M.G., Major F. J. Greig, Captain A. Pearse, and Lieut. E. B. Knox. Lieut.-Col. Simpson was appointed Hon. Secretary. It was decided that each district should elect one Warrant or Non-commissioned Officer and one man to represent the wishes of those ranks on the Committee. The business of the meeting consisted chiefly in defining the duties of the Committee, to which were handed over all questions regarding the obtaining of subscriptions, the design, execution and erection of the Memorial, and its site, the meeting merely expressing the opinion that it should be an outdoor memorial.

It was decided that subscriptions should be limited to all ranks of the Royal Army Medical Corps, the term here to include the Royal Army Medical Corps Militia and Volunteers, as well as all others who served with the Corps on an attestation, but not those who served on a civil contract, nor the Colonially enlisted corps. At first only those who had served in South Africa were asked to subscribe, though all subscriptions (within the limits noted above) were received, but later, as the amount was insufficient, all officers of the Corps were asked to subscribe, and with good results. The amount to the credit of the Fund is now over £1,000.

As to the nature of the memorial ; at the general meeting it was decided that it should take the form of an outdoor monument, while at the Committee meeting it was further settled that the general form should be that of an obelisk ; but the Committee, after inspecting some designs, decided to put the detail of the design in the hands of an architect, Mr. R. Weir Schulz. Mr. Schulz laid some drawings before the Committee, of which one has been selected, and Mr. Schulz has been instructed to prepare detailed drawings and to obtain estimates for the erection. In the design which has been approved an obelisk stands slightly in front of a semicircular wall. At the base of the obelisk is a bronze bas relief indicating the nature of the work of the Corps. The wall behind it is divided into panels, each of which contains a bronze tablet, on which will be inscribed the names (313) of those who fell in South Africa.

As to the site ; Aldershot was selected by a large majority of the Committee, and a sub-Committee, with the assistance of Mr. Schulz, visited Aldershot with a view to selecting the exact position. A site in front of the Cambridge Hospital which was at first recommended was found to be unsatisfactory from an artistic point of view. The site finally selected is at the top of Gunhill Road, and sanction for its appropriation has been asked. It is proposed to fence off an area some thirty feet long by twenty deep from the grounds of the Royal Army Medical

Corps Mess, fronting on the road. Access will be obtained only from Gunhill Road for those who wish to inspect the monument more closely. The obelisk, with the wall behind it, should tell very effectively against the backing of trees.

It is hoped that those officers who have not already subscribed will do so as early as possible. Application has been made to each officer, but owing to their movements, no doubt many of these circulars have failed to reach those to whom they were addressed. It is most desirable that the Memorial should be worthy of its object, and the larger the sum the Committee have at their disposal the more likely is this to be the case.

It only remains to add that owing to the fact that the lists of subscribers from South Africa were very incomplete, no doubt a good many officers who had subscribed were asked again for a subscription. This was unintentional, but the Committee were compelled to assume that those whose names did not appear in the lists had not subscribed.

THE SIR WILLIAM TAYLOR PRIZE.—The following circular letters concerning this Prize are published for the information of all officers of the Corps, as it seems from correspondence that has been received that although they were very widely distributed to all Principal Medical Officers at home and abroad, many hundreds of copies being issued, some officers are still unaware of the conditions. This is very likely to happen in the case of officers being on leave or changing stations when circular letters are sent out, but the Committee think that through the medium of the Journal, the Prize will be brought to the notice of every officer of the Corps.

Circular I.—An Annual Prize of the value of 25 guineas is offered by Surg. General Taylor, M.D., C.B., K.H.P., Director-General Army Medical Service, for scientific and professional work among the officers of the Royal Army Medical Corps.

It will be called the Taylor Prize, and will be awarded annually to the executive officer of the Royal Army Medical Corps on the active list, or on full pay employment below the substantive rank of Colonel, who shall, in the opinion of the Committee named below, be most deserving on account of professional or scientific work.

The members of the Committee will not be eligible for this Prize.

Principal or Senior Administrative Medical Officers of Districts and Commands at home and abroad may at any time during the year submit the names of any officers whom they may recommend as deserving of consideration by the Committee for this Prize.

The grounds for the recommendation will be briefly set forth with such evidence or reference as may be necessary in each case, specifying whether for exceptional professional ability in medicine or surgery, scientific research, preventive medicine, sanitation, bacteriological investigation, epidemiology, &c., &c.

Any similar reports from the officer under whom the officer concerned is actually serving may be transmitted as a guide to the Committee, but it will be understood that only services of distinguished and exceptional merit will be taken into consideration.

Direct application from officers will not be considered, and essays or reports prepared specially for this prize are unnecessary.

In the event of the recommendations made by Principal Medical Officers in any year not containing evidence of services of a sufficiently high standard, the Committee reserve to themselves the right to award the prize for work of exceptional merit submitted in a previous year which has not received this recognition.

The Committee will be the Director-General and the staff of officers at headquarters for the time being, one of whom will act as Secretary; but in case of technical or abstruse scientific work, the Committee reserve the right of calling in competent assessors in any special subject with a view to obtaining their opinion as to its value.

Recommendations must be despatched on or before December 31 of each year.

The proceedings throughout will be regarded as confidential.

The name of the officer selected will be duly recorded in the Appendix of the Annual Report of the Army Medical Department, and in the official Army Lists.

The first award will be made on Reports received after December 31, 1902, for work brought to notice but not necessarily commenced in that year.

February 14, 1902.

E. M. WILSON, *Lieut.-Col. R.A.M.C.*,

Hon. Secretary.

Circular II.—The Committee desire to draw the attention of all Principal Medical and other Officers of the Corps to the rules and regulations of this Prize, as set forth in the circular which was widely distributed in February, 1902.

The conditions laid down in paragraphs 10 and 13 must be carefully borne in mind, viz., that recommendations must be *despatched* on or before December 31 of each year, and that awards will be made on reports received for work *brought to notice*, but not necessarily commenced in that year.

If these conditions are not complied with no award can be made, and as there appears to have been some misapprehension on this subject, the Committee have decided to issue this additional circular, in order to prevent any possible misunderstanding in the future.

War Office,
May 31, 1903.

E. M. WILSON, *Lieut.-Col., R.A.M.C.,*
Hon. Secretary.

THE WOOLWICH COMPANIES R.A.M.C.V.—The annual camp of these companies was held at Shorncliffe from August 1 to 15. The strength during the first week was 12 officers, 374 N.C.O.'s and men, 21 horses and 6 waggons; during the second week, 8 officers, 301 N.C.O.'s and men, 11 horses and 6 waggons.

Lieut.-Col. Stephenson, V.D., was in command, and the other officers present were: Majors C. H. Hartt and A. S. Greenway; Capt. T. P. Jones, R.A.M.C. (Adjutant), M. Taylor and T. W. Bartlett; Lieuts. A. H. Minton, E. B. Dowsett and W. H. Payne; Lieuts. and Quartermasters J. H. Naylor, J. P. Ekins and A. J. Naylor.

The companies left Woolwich by special train on August 1, except the Cyclist Company (No. 4), which proceeded by route march—51 strong. The weather in camp up to the last two days was favourable and much useful work was got through. The training consisted of bearer company and field hospital practice and of instruction in hospital duties, this latter being carried out at the Shorncliffe Station Hospital.

On August 5 the G.O.C. 4th Army Corps inspected the field practice. In his subsequent memorandum Lord Grenfell stated that "he was much interested with the Woolwich Volunteer Ambulance Company work, which appeared thoroughly practical and to be carefully thought out." The following day the Inspector-General of Auxiliary Forces visited the companies at work and expressed his entire satisfaction.

On August 7 the annual inspection was held by Col. R. H. Quill, P.M.O., S.E. District. After the march past the companies were inspected in field duties, and at the conclusion Col. Quill congratulated Lieut.-Col. Stephenson on their efficiency.

On August 15 the camp was broken up. The Cyclist Company proceeded by route march to Woolwich, and the other companies, with their horses, waggons and baggage, left by special train at 12.20 p.m.

NOTES FROM GIBRALTAR.—Our correspondent has only cricket news, and writes: "Up to the present the Cricket Club has had a fairly successful season. Although the detachment only numbers about 90, we have been able to get together a team fit to compete with the regiments and corps in the garrison. Eighteen matches have been played, of which 9 have been won, 3 drawn, and 6 lost. The chief run-getters have been Capt. Fawcus and Sergt. Taylor. The former has made 645 runs, with an average of 64 per innings; the latter 490 runs, with an average of 30. The brunt of the bowling has also been borne by the two named. Lieut. Stephens has also made useful scores on occasions. Four of the team were included in the Staff and Departments team which played in the Garrison Cup Competition, and out of a total of 158 made by that team, 122 were compiled by the R.A.M.C. representatives. Capt. Fawcus and Sergt. Taylor also played for the Garrison."

NOTES FROM INDIA.—Major C. R. Elliott, who is Sanitary Officer to the Bombay Command, has been granted an extension of his appointment to March 31, 1906. Capt. S. G. Butler is officiating as personal assistant to the P.M.O. Madras Command, during the absence on leave of Capt. A. E. Milner. Major H. Cree has been transferred from Wellington to Bangalore.

NOTES FROM THE SCOTTISH DISTRICT.—Capts. Fox and Boyle have joined from the R.A.M.C. College. The former is posted to Fort George and the latter to Aberdeen. Capt. McNaught has been appointed Sanitary Officer at Headquarters. Sergt.-Major Jackson has been posted to Glasgow, rejoining the 13th Company; while 2nd Class Staff-Sergt. H. Duff has left for North Nigeria.

At a recent Church Parade at Edinburgh Castle the following received South African medals from Field Marshall Lord Roberts; Sergt.-Major A. King, Corpl. J. Davies and Pte. E. Brown were presented with both the King's and late Queen's medals, and Corpl. A. Simmons, Corpl. G. Angus and Pte. W. Greaves received the late Queen's medal for service in South Africa. At the same parade Sergt.-Major A. King was presented with a Long Service and Good Conduct medal.

NOTES FROM WOOLWICH.—Lieut. and Quart.-Master Hawkey with 1st Class Staff-Sergt. Ritchie and two Privates of No. 12 Company left for Bulford Camp on August 19, while the following left for the manoeuvres on September 5, namely, Lieuts. Balck, Storrs, Conway, Reed and Skey. Capt. Prynn joined on August 28, to take over the duties of Pay Officer, No. 12 Company, in relief of Capt. C. T. Samman, who is under orders for Jamaica. Lieut. Seccombe embarked for service on the West Coast of Africa on September 12, while Lieut. F. A. Clarke embarked on the "Soudan" for India on the 7th.

Our cricket season is now virtually over. An interesting game was played on August 11 between the N.C.O.'s and men and Officers, being won by the former by the narrow margin of 10 runs. For the losers a top score of 43 was made by Lieut. Meadows. No. 12 Company played our 10th Company at Chatham on August 20. The weather was most unfavourable, causing the match to be unfinished.

NOTES FROM ALDERSHOT.—Our correspondent writes that the cricket, which flourished up to the end of June, every match having been won, has fallen off in good results during the latter part of the season. This has been due chiefly to casualties in the team, seven of the original eleven having either left the garrison or been unable to play owing to camps of exercise.

The Corps Athletic Sports came off, in spite of unfavourable weather, on August 15. Among the most interesting events were the Tug-of-war, in which the honours rested with No. 1 Company, and the competition in the R.A.M.C. Challenge Shield, wherein No. 1 Company was again victorious. The prizes were given away by Mrs. McNamara. The unsettled state of the weather did not prevent the presence of a large number of visitors, whose interest was sustained quite up to the close of the last event. The following were the results of the various competitions:—Throwing the cricket ball, Pte. Black; high jump, Pte. Sproule; putting the shot, Pte. Green; football place kick, Pte. Emery; long jump, Pte. Sproule; 120 yards hurdle, Pte. Walton; 2 miles bicycle race, Pte. Tavern; 220 yards (Corporals), Yendal; bicycle costume 220 yards, Corpl. Yeoman; mile race (open to Garrison) Pte. Bertwistle, 3rd Battalion Scots Guards (won by 5 yards); 100 yards, Pte. Bailey; 220 yards, Weston; Johnson Challenge Cup (one mile), Pte. Clark (won by a couple of yards); Officers' 100 yards, Lieut. Webb; tug-of-war, Cambridge Hospital beat Connaught Hospital; ¼-mile, Pte. Perkins; 100 yards, Sergt. Angell.

THE SPECIAL CORPS DINNER.—Officers of the Corps will be interested to hear that the arrangement for the special Dinner which will be held on October 21, at the Whitehall Rooms, Hôtel Métropole, are now practically complete, and that there is every probability of a most successful evening. Twenty guests have accepted the invitation, and it is expected that 60-70 officers of the Corps will be present. Officers who may desire to attend and who have not previously notified their intention are requested to do so without delay to the Hon. Secretary. Any who have not already sent their subscription should enclose the amount (10s.) with their application. The subscription is to defray the entertainment of the guests and other incidental expenses. The charge for the dinner itself, 32s. 6d., will be paid personally by the members themselves to the clerk at the Hotel on arrival.

BIRTHS.

CONOLLY.—On September 7, at Station Road, Netley, the wife of Lieut. and Quart.-Master J. B. Conolly, R.A.M.C., of a son.

HODGSON.—On August 31, at Darjeeling, the wife of Capt. J. E. Hodgson, R.A.M.C., of a son.

MARRIAGES.

GODDARD—HOWARD-REYNOLDS.—On August 25, at Wynberg, South Africa, Capt. G. H. Goddard, R.A.M.C., youngest son of the late Lieut.-Col. T. Goddard, 44th Bengal Infantry, to Ida Rose Lara, fourth daughter of the late J. Howard-Reynolds and Mrs. Howard-Reynolds, of the Avenue, Kew Gardens.

WINDER—GARDINER.—On September 17, at St. Paul's, Portman Square, by the Rev. T. E. Winder, Rector of Fiddown, co. Kilkenny (brother of the bridegroom), assisted by the Rev. W. Moore, of the parish, Herbert Winder, R.A.M.C., to Esther Amabel (Essie), younger daughter of E. B. Gardiner, of Bickenhall Mansions, Portman Square, and Carse Grange, Errol, Perthshire.

DEATHS.

COLLETT.—On August 18, at Manila, Philippine Islands, H. G. Outram Collett, of the Army Medical Reserve, and of Cheyne Lodge, Southsea, aged 40.

PATTERSON.—The death is announced of Lieut.-Col. Thomas William Patterson, D.S.O., who retired from the Royal Army Medical Corps in 1889, after twenty-three years' service, in the course of which he was engaged in the Afghan War of 1878 (Medal), the Soudan Expedition of 1885 (Medal with clasp and bronze star), and in Burma in 1886 and 1887, being mentioned in Despatches and receiving the Distinguished Service Order. He died at Ramelton, Ireland, on the 2nd inst., having but recently completed his fifty-ninth year.

ALLIN.—We greatly regret to announce the death, on September 8, 1903, in India, of Col. William Briggs Allin, M.B., from bronchitis. Col. Allin was in his fifty-second year, and was holding the appointment of Principal Medical Officer, Bombay and Nagpur Districts. He entered the service February 4, 1877; was promoted Surg.-Major, June 15, 1885; Surg.-Lieut.-Col., September 30, 1893; Brig.-Surg.-Lieut.-Col., July 9, 1896, and Col. R.A.M.C., November 29, 1900. He served in the Afghan War, 1878-80 (medal); Soudan Expedition, 1884-5; Nile; in charge of Field Hospital at Gakdul Wells (Despatches, *London Gazette*, August 25, 1885; Medal with clasp; bronze star). Promoted Surg.-Major. Isazai Expedition, 1892. South African War, 1899-1902; P.M.O. Field Army, Natal, and Section Lines of Communication. Relief of Ladysmith. Despatches (Sir R. H. Buller, March 30, June 19, and November 9, 1900), *London Gazette*, February 8, 1901. (King's medal with two clasps). Promoted Colonel.

THE R.A.M.C. FUND.

The sum of £10 7s. 8d. has been received from Capt. A. H. Waring, R.A.M.C., acting for the "Forrest Memorial Fund." The object of this Fund is to erect a brass to the memory of Capt. E. G. Forrest, R.A.M.C., at the Royal Army Medical College. The subject will be before the Committee at its next meeting.

NOTICE.

Officers desiring to support the R.A.M.C. Fund can obtain, on application to the Hon. Secretary, a copy of the proceedings of the Committee up to date, together with an Order Form for the Annual Subscription.

The subscription for officers on the Active List is £1 per annum ; for convenience of record, officers are asked to forward their order forms through the Hon. Secretary.

Officers on retired pay desiring to allocate their subscriptions to special objects can obtain a special form for this purpose.

68, Victoria Street, S.W.

September 17, 1903.

B. SKINNER, *Lieut.-Col.*,

Hon. Sec.

 ANNOTATIONS.

OUR FOREIGN GARRISONS.—More than one correspondent has written to us asking for a series of articles upon the climate, diseases, sporting possibilities, &c., of our various foreign stations. There are but few of us who, at some time or another, have not wished for information of the kind, more especially when detailed to take our place on the foreign service roster. We think a series of articles giving information as to personal needs and other facts connected with our foreign garrisons would be welcomed ; if our various readers will furnish us with either articles *in extenso*, or with the necessary facts on which such articles might be prepared, we shall be glad to publish them for mutual advantage.

KAFFIR MEDICINES AND TREATMENT.—An esteemed correspondent writes, it would be interesting to know if any of our officers who served in South Africa had any experience of the Kaffir treatment of diseases, and whether such experiences were as satisfactory as those given by Mr. D. M. Wilson in his book called "Behind the Scenes in the Transvaal," published by Cassell and Co. We need hardly say that should any of our readers have information, from personal experience or otherwise, of the medical practice of Kaffirs or any other native race, it will be cordially welcomed in the pages of this Journal.

THE FRENCH ARMY MEDICAL MANŒUVRES.—To files of *Le Temps* of August 29 and September 1 we are indebted for certain details regarding the annual manœuvres of the French Army Medical Corps. They appear to have been specially planned for a rehearsal of the official methods of dealing with the wounded from the first line, for the instruction of medical officers of the reserve and territorial army, and for a critical survey of equipment with a view to its improvement. The post of technical critic was assigned to the well-known bacteriologist, M. Vaillard, Senior Medical Officer of the Military Hospital of Vincennes. The area of operations was the plain of Champigny, where the 10th Division of Infantry, belonging to the Paris garrison, was detailed to operate as a force attempting a sortie from Paris and then falling rapidly back. The general arrangements for imitating the terrors of war were not dissimilar to those familiar to ourselves, whereby a certain number of soldiers are previously labelled as suffering from various injuries or wounds, and then caused to fall out of the ranks as casualties, to be tended and removed to the hospitals in rear by the medical corps. In these exercises at Champigny, the staff of the stationary hospitals seems to have consisted exclusively of officers of the medical reserve and territorial army, whilst the officers of the field hospitals were medical officers on the active list. From our point of view, the chief interest of these manœuvres lies in the fact that, in the case of a force operating over a level plateau with very little shelter, as the 10th Infantry division appears to have done, the dressing station (*poste de secours*) could not be located any nearer the fighting line than 2,000 metres, owing to the movements of the bearers and others being within the dangerous fire zone. The inference drawn by our French colleagues is that in such circumstances they must either locate the dressing stations on the flanks of the force engaged, as being less within the zone of fire, or do away with

them altogether, and trust to a more elaborate outfit with the regimental surgeons for affording first aid in and near the firing line. We are quite of opinion that under the conditions of modern warfare there are distinct limitations to the picking up of wounded men in exposed portions during the progress of a battle, and that by a fuller reliance upon the utility of the first field dressing, borne on the person and applied where possible by the wounded man himself, must we depend until a lull in the firing permits of actual clearance of the field by bearers and ambulances. We confess to some difficulty in understanding why, at these manœuvres near Paris, it should have been supposed that the dressing stations and collateral ambulance service could have worked in exposed places without great risk. Our experiences in some parts of South Africa clearly showed this to be a very real difficulty for the medical service in the first line. Judging by the reported remarks of M. Vaillard, he seems to have been an ideal director and umpire of these medical manœuvres; many of his observations are of practical interest to ourselves, as they deal with details and defects in the equipment of the field hospitals, especially as to their cumbersomeness and want of uniformity and interchangeability. These features have long been recognised by ourselves as unpardonable defects in field medical equipment. The ambulance transport, too, seems to have come in for considerable criticism, so that in the matter of defects of this kind we do not seem to hold a monopoly.

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.—The following extracts are made from the *London Gazette* :—

Miss A. B. Wohlmann to be Sister, dated May 28.

Miss S. B. Lanyon to be Staff Nurse, dated May 28.

Miss J. G. Powell and Miss P. Young to be Sisters, dated June 13.

Miss A. C. Jacob, Miss L. F. A. Waller and Miss K. Pearse to be Staff Nurses, dated February 17 and June 13.

Miss H. Suart to be Sister, dated June 27.

Miss M. L. Rannie to be Matron, dated June 29.

Miss E. M. Denne, Miss E. H. Hay and Miss D. M. Taylor to be Staff Nurses, dated June 26 and July 6.

Staff Nurse Miss S. R. Hughes-Hallett resigns her appointment, dated June 26.

Miss S. J. Browne to be Matron-in-Chief, dated April 4, 1902.

Miss E. S. Mason, Miss M. M. Rees and Miss M. Walker to be Staff Nurses, dated August 3.

Sister F. A. G. Kinahan resigns her appointment, dated August 31.

The following "Changes of Station" are notified :—

Matron : Miss M. L. Rannie on appointment to Woolwich.

Sisters : Miss D. V. Briscow, Woolwich to Egypt ; Miss J. M. Clay, on appointment to Portsmouth ; Miss C. P. Gash, on appointment to Aldershot ; Miss H. McCurdy, Gibraltar to Gosport ; Miss H. L. Neale, South Africa to Netley ; Miss P. Young, Canterbury to Aldershot.

Staff Nurses : Miss A. R. F. Auchmutz, on appointment to Netley ; Miss E. M. Denne, on appointment to Woolwich ; Miss E. N. Hay, on appointment to Alton ; Miss E. S. Mason, on appointment to Aldershot ; Miss K. Pearse, York to Aldershot ; Miss M. M. Rees, on appointment to Aldershot ; Miss D. M. Taylor, on appointment to Dublin ; Miss L. F. A. Waller, Portsmouth to Aldershot.

The following ladies have been warned to embark on the troopship "Plassey" for duty on the voyage :—

Miss A. E. Tait, as Matron ; Miss A. F. Byers, as Staff Nurse.

NOTICE TO SUBSCRIBERS.

THE Editor will be glad to receive original communications upon professional subjects, travel and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Capt. H. P. Johnston, Major Donegan, Major Mould, Major Freeman, Major Forrest, Mr. Hewlett, Major Hardy, Civil Surgeon Ash, Major Begbie, Lieut. Balck, Major Horrocks, Major Melville, Col. Quill, Capt. O'Grady, Col. Blennerhassett, Lieut.-Col. Hathaway, Major Hallaran, Capt. Fleury, Capt. Greenwood, Lieut.-Col. Woods, Lieut.-Col. O'Sullivan, Lieut.-Col. Younge, Lieut.-Col. Sylvester, Major Aldridge.

The following periodicals have been received : *The Medical Record*, *The Medical News*, *New York Medical Journal*, *Gazette Med. de Paris*, *Il Morgagni*, *The Medical Review*, *El Siglo Medico*, *Der Militärarzt*, *Deutsche Militärärztliche Zeitschrift*, *Anales de Sanidad Militar*, *Revue Med. de la Suisse Romande*, *La Medicina Militar Española*, *The Boston Medical and Surgical Journal*, *Annali di Med. Navale*, *Giornale del Regio Esercito*, *Le Caducée* ; also " *Genfer-Konventionen*," by Capt. Hans Daae, and " *Cancer and the Precancerous Condition*," by Major Fink.

Journal
of the
Royal Army Medical Corps.

Original Communications.

BERMUDA AS A GARRISON.

BY MAJOR E. C. FREEMAN.

Royal Army Medical Corps.

THIS sketch is intended to give some information to officers and others proceeding on duty to the colony of Bermuda, in order that they may have some idea of the place they are going to, and what sort of kit it is best to take out. As many members of the Corps are married, some points which may be useful to ladies are included.

Bermuda, or more correctly the Bermudas or Somer's Islands, forms a station which, in proportion to its size, absorbs the services of a good many medical officers, and about which little has been written. The islands were discovered by the Spaniards under Juan Bermudez in 1515, and called by them, on account of the prevailing storms, Los Diabolos. In 1609 Sir George Somers, with an expedition bound for Virginia, driven by stress of weather to Bermuda, founded the colony, which was for many years in the hands of a trading company. It was nearly lost to Britain at the time of the American War of Independence, and during the Federal War of the United States enjoyed a phenomenal prosperity as a base for the Confederate blockade-runners. Apart from this its history has been a peaceful one, chequered only by the domestic troubles

inherent in any self-governing colony. Its chief importance has been derived from its position as a naval base and dockyard, and on this account it is strongly fortified and garrisoned. How important this position is may be learned by a glance at the map, which shows it lying about 500 miles from New York and 625 miles from Cape Hatteras, which is the nearest point on the mainland. It is about half-way between Halifax, Nova Scotia, and the West Indies, thus earning the title of the Gibraltar of the Atlantic. It may be reached *via* Halifax—changing there into a Pickford and Black steamer—or from New York by the Quebec Steamship Line; this latter is by far the quicker and more pleasant, but also the more expensive route. Besides these services, the Cayo Line (offices in Great St. Helens, E.C.) despatches monthly steamers from London, but these are essentially cargo vessels, although passengers are carried.

Bermuda is said to consist of 365 islands, but many of these are barren rocks. There are at any rate five principal ones, which are connected together by bridges and form the main land. The total area is only 19 square miles, but it is so spread out and interspersed with bays and harbours that it looks much larger. The islands are of coral limestone, and are the most northerly group of coral islands in the world. They form the summit of a great submarine mountain about the height of Mont Blanc; soundings outside the reef which encircles the islands going at once to great depths, while the water within the reefs is shallow and only navigable by ships along certain channels.

Bermuda is in latitude 32° 15' N. on the south-east margin of the Gulf Stream, and thanks to this enjoys a very equable climate, the thermometer seldom rising above 85° F., or falling below 50° F. It must be remembered, however, that owing to the situation of the islands the air is always full of moisture, so that any fall below 60° F. is distinctly cold, and any rise above 80° F. is correspondingly oppressive. Fires in winter are, therefore, occasionally necessary to counteract the raw dampness of the air, and the moist heat of August and September is trying and enervating. Officers going to Bermuda should take some warm clothing for winter and plenty of very thin raiment for summer. Moth or damp play havoc with furs, feathers, gloves and silk materials. For uniform, khaki is the convenient and usual wear. Blue with white helmet for ceremonial occasions in winter, and white in summer. Khaki serge,

unless very thin, will be found too thick for comfort during the greater part of the year ; and a regulation waterproof is a necessity. A straw hat can be worn throughout the hot weather, preferably a Panama, with a broad brim to protect the eyes from glare, which is often excessive. Ladies do not need any special sun-proof head-gear, although a white covered parasol is advisable. There are excellent "Stores" in Hamilton, where most articles of dress can be procured, but it is advisable to take out some boots, saddlery, and one or two blue serge or tweed suits. In the winter there is a good deal of entertaining owing to the large influx of American visitors, and ladies who enjoy society will find opportunity for smart toilettes, both afternoon and evening. It may be mentioned here that all house furnishing can be done locally, and it is not necessary to take out glass or china. Bicycles of American make can be obtained easily, while on English ones duty has to be paid, and repairs are troublesome, American fittings being of different pattern.

Houses are sometimes difficult to get, but rents are not exorbitant, and there are a certain number of Government quarters. Bedrooms can be had by members at the Royal Yacht Club. The cost of living in Bermuda has been much exaggerated, although, of course, it cannot compare with India or the West Indies for cheapness, and a Colonial allowance of 2s. 6d. per diem has lately been granted. Servants are mostly coloured people and have the faults of their race, but satisfactory ones do exist.

Bermuda had for many years a reputation for extreme unhealthiness, owing to the prevalence of enteric and some terrible outbreaks of yellow fever ; but the latter disease was always imported, and the last epidemic occurred in the early sixties. It is not likely to be brought again to the islands, as there are excellent quarantine regulations now in force. Enteric has diminished steadily before improved sanitation, and though there was a slight recrudescence of it during the time the Boer prisoners were on the islands, Bermuda is now one of the healthiest of all our military stations. Children as a rule do well ; the place, however, should be avoided by any one with a tendency to consumption, as the warmth and moisture of the climate seem to favour the disease. The water supply is entirely derived from rain-water, which is collected from the roofs and "catches" and stored in tanks, usually underground. In the majority of barracks and in the town of Hamilton excreta

is dealt with in dry-earth closets, but elsewhere water carriage conveys the sewage into cesspits.

The population consists, apart from the naval and military element, of 17,535 persons, of whom 6,383 are white, so that Bermuda is one of the most thickly populated parts of the British Empire. The coloured population are the descendants of the slaves liberated in 1834, mixed with white and Red Indian blood, as well as many negroes from the West Indies, so that every tint, from deepest black to palest yellow, is met with. The white population are descended from the old settlers, with an infusion of Americans and Canadians, and hold all the official and mercantile positions. They are a very kindly and hospitable people. The Government is in the hands of the House of Assembly and Legislative Council, presided over by the Governor, who is also the Commander-in-Chief. The garrison consists of two line regiments and three companies each of Royal Garrison Artillery and Royal Engineers. The North American Squadron always winters at Bermuda, there being an important dockyard with a great floating dock, so that the naval element is considerable.

Owing to the scattered conformation of the islands there are three Garrison Hospitals : one at Prospect, which is the headquarters, one at St. Georges, and one at Watford : a Major of the Corps is in command of each of the two latter, and at St. Georges usually holds the post of Health Officer in addition. At Prospect there is a Lieut.-Colonel, who is S.M.O. when the P.M.O. is away inspecting in Canada or the West Indies. In the summer a junior officer is in medical charge at Warwick Camp, where the garrison does its annual musketry course.

The principal amusements are boat sailing and fishing, but cricket, football, tennis and hockey are all to be had, and there are several good golf links. Shooting and polo do not exist, but there is an annual race meeting on a most abominable racecourse, and horse-back paper-chases have been lately started. Horses, buggies and dog-carts are best obtained locally.

Hamilton is the principal town, with the Government offices, a fine modern cathedral, and excellent shops. There are two great winter hotels much patronised by American visitors, and there are also the American House, Windsor, and Kenwood Hall, which are cheaper, smaller and less comfortable establishments, as well as several boarding houses ; these are open all the year round.

The Princess and Hamilton hotels are open only during the American season, from December to May, and give weekly dances, while receptions and garden parties are held at Government House, which lies a little way out of town. Prospect, on the hills two miles from Hamilton, is the military headquarters, with excellent new barracks. St. Georges, 12 miles away, is the old capital and the headquarters for R.A. and R.E., as it is heavily fortified. It is a sleepy old place, full of interesting and historical memories, and boasts a fine harbour, the entrance to which is now to be greatly improved. The road thence to Hamilton passes over a causeway more than two miles long. Watford, at the other end of Bermuda, is a desolate spot close to the naval headquarters at Ireland Island, and the hospital for the small garrison there has been made out of the old convict barracks. It is a good place for boating, and access to Hamilton is by steam launches, which cross the harbour at regular hours.

The zoology of Bermuda is chiefly marine, the fauna approximating more to the American than to the West Indian type in its main features, being very rich in many departments, especially in fishes, the most beautiful being the glorious blue and gold angel fish. Reptiles are represented by two lizards and a huge bull frog, the latter a recent importation from America. Birds, besides the blue bird, Virginian cardinal and little "chick of the village," are chiefly marine, with stray visitors from the American continent and West Indies. The British sparrow has been introduced and has already done much mischief. Mammals are represented by a few rats, mice and bats. There are very few butterflies, but more moths, none, however, remarkable. Mosquitoes abound, breeding in the water tanks, but *Anopheles* is fortunately absent; and there is no malaria, although many cases were imported from South Africa. Large hairy spiders and large cockroaches are a feature in the older houses, the latter having voracious appetites for boots and clothes.

The zoology of Bermuda is being worked out by American naturalists, who go there every summer for the purpose, and a local natural history society has been formed: a government grant has also been given towards a museum. It is hoped that a permanent marine biological station—for which the place is eminently suitable—will soon be established.

The botany of the islands shows a mixture of tropical and tem-

perate forms, all introduced, except the palmetto and the all-pervading Bermuda cedar, which are indigenous. The banana, pappaw and bamboo all flourish, while the pink and white oleanders clothe the islands in summer with exquisite tints. Lilies grow well, and Harris's lily from Japan is now introduced and has become an article of export second only in importance to the Bermuda onion, which was originally derived from Madeira. Mangroves flourish near the sea, and all sorts of creeping plants and grasses on the sands of the south shore. Oranges, lemons, and many fruits once common are now rare, and the Bermuda arrowroot is not much cultivated nowadays. There is a small public botanical garden where experiments in the cultivation of suitable and profitable plants and vegetables are carried out.

The geology of Bermuda is a vexed question into which we cannot enter here, but it is now generally agreed that the islands are not a typical coral formation, and also that they are not of volcanic origin. They are probably the remains of a much larger island which once extended to what is now the outer reef. The surface of the islands is of stratified limestone *débris* from the coral, and in many places it is honeycombed with caves showing remarkable stalactite growths.

In conclusion, the recollections of some very happy years spent in Bermuda crystallise themselves into two pictures: first the dark emerald islands lying in a tropical sea of deepest turquoise, in which every reflection is mirrored, while all around are broad-leaved bananas, pink oleanders, and purple Bourgainvilleas against the grey-green cedars; or else the sky is black and the wind shrieks past one's ears, the great waves hurl themselves against the rocky shore, and the loud roar of the surf fills the air. In either case there is much to attract anyone who is a lover of Nature and the sea.

THE WORK OF A VOLUNTEER UNIT., R.A.M.C., IN CAMP.

By COL. J. EDWARD SQUIRE,

Commanding London Companies, R.A.M.C. Vol.

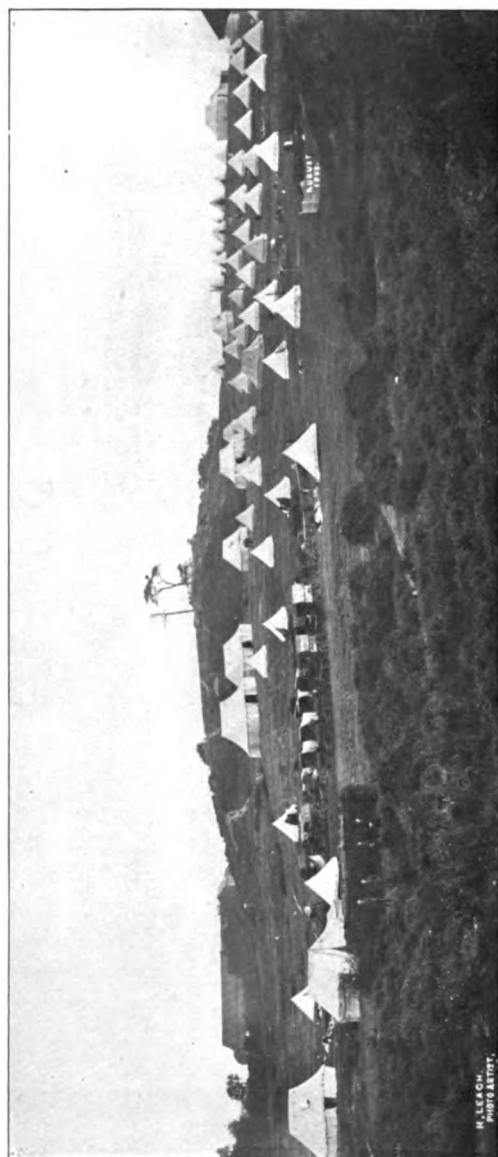
THE training of volunteers in military duties is beset with considerable difficulties. The men, having to gain their livelihood by their civil occupations, can only devote their spare time to learning military work, and however keen a man may be, the time at his disposal for this purpose is very limited. At the weekly drills and at the larger parades on Saturday afternoons, the same men rarely work together, and the *personnel* of the squad or company on parade is practically never the same on any two occasions. It is only during the annual training in camp that the same men fall in together on several successive occasions, and can be given systematic training as a unit. With only one week allotted in the year for such continuous systematic training, it is a matter of some anxiety so to arrange that the fullest amount of practical instruction can be given during that time. It is true that the mere life in camp, the daily methodical routine of a community under discipline, is in itself a valuable training, and goes far to change the civilian into the soldier. But soldiers, like civilians, must learn their trade, and the volunteer, in addition to a soldierly spirit, must acquire a practical knowledge of the soldier's work. In order that the fullest advantage may be taken of the short period (only five working days) which is available for this serious work, not only must every available hour during that period of training be utilised, but the work must be thoroughly organised and thought out beforehand.

The following sketch of the work actually performed by the London Companies under my command during this year's camp training, besides showing what a large amount of practical work can be compressed into a week, if the scheme of work has been carefully organised in advance, draws attention to a detail and amplitude of training rarely attempted. Though we can teach stretcher drill, first aid and nursing at our Headquarters, a knowledge of these alone would not take us further than the various civilian ambulance associations, and we should still be absolutely unfit to take up duties with troops as an efficient military unit.

The organisation of the army necessitates that records and reports should be made in proper form, and in no branch of the service is this work more essential than in the medical corps, which takes over men from various units, many of whom are unable to look after themselves or their equipment and property, and all of whom are the objects of anxious inquiry from friends both in and outside the army. The proper filling in of army forms, the keeping correctly of army books, and the requisitioning of stores, are matters which can only be learned by actually doing the work. I therefore wished to give my officers, N.C.O.'s and men, some practice in the routine work of a Field Hospital on service, admitting and discharging patients, taking over their kits and valuables, ordering and procuring medicines and comforts, &c., &c., using the proper forms and books, in fact doing everything strictly in accordance with regulations and under service conditions. It is in those details that volunteer units are so liable to fail.

In order to carry out this scheme on the occasion of our annual training at Aldershot this year, I had the camp pitched as a Field Hospital, as laid down in the manual for the Corps. The men lived in the hospital tents, leaving two rows (ten tents) vacant for instructional purposes. The operating tent, the office, the pack-store and surgery tents were also left unoccupied. The transport section occupied all the tents round the horse lines, where our horses (twenty-four) were picketed. Living as they did for a week in this camp, the men will not easily forget the appearance and arrangement of a Field Hospital encampment. The officers' lines, officers' and serjeants' messes, canteens, quartermaster's store tent, &c., were pitched outside the limit of the hospital camp (see fig. 1). The general appearance of our encampment is shown in the plate, from a photograph by Leach of Aldershot.

A hospital marquee (outside the Field Hospital camp) was fitted with two bedsteads, with bedding, bedside-tables, head boards with diet sheets, &c., so as to illustrate the difference between the equipment and provision for patients in a general stationary hospital and in a Field Hospital. This marquee was utilised further for practical instruction in the nursing of helpless patients, as well as in the drill of striking and pitching marquee tents. The actual equipment for a Field Hospital was drawn



U.S. ARMY
PHOTOGRAPHY

PLAN OF CAMP, ALDERSHOT, 1908.
R.A.M.C. (VOLS.). LONDON Co's.

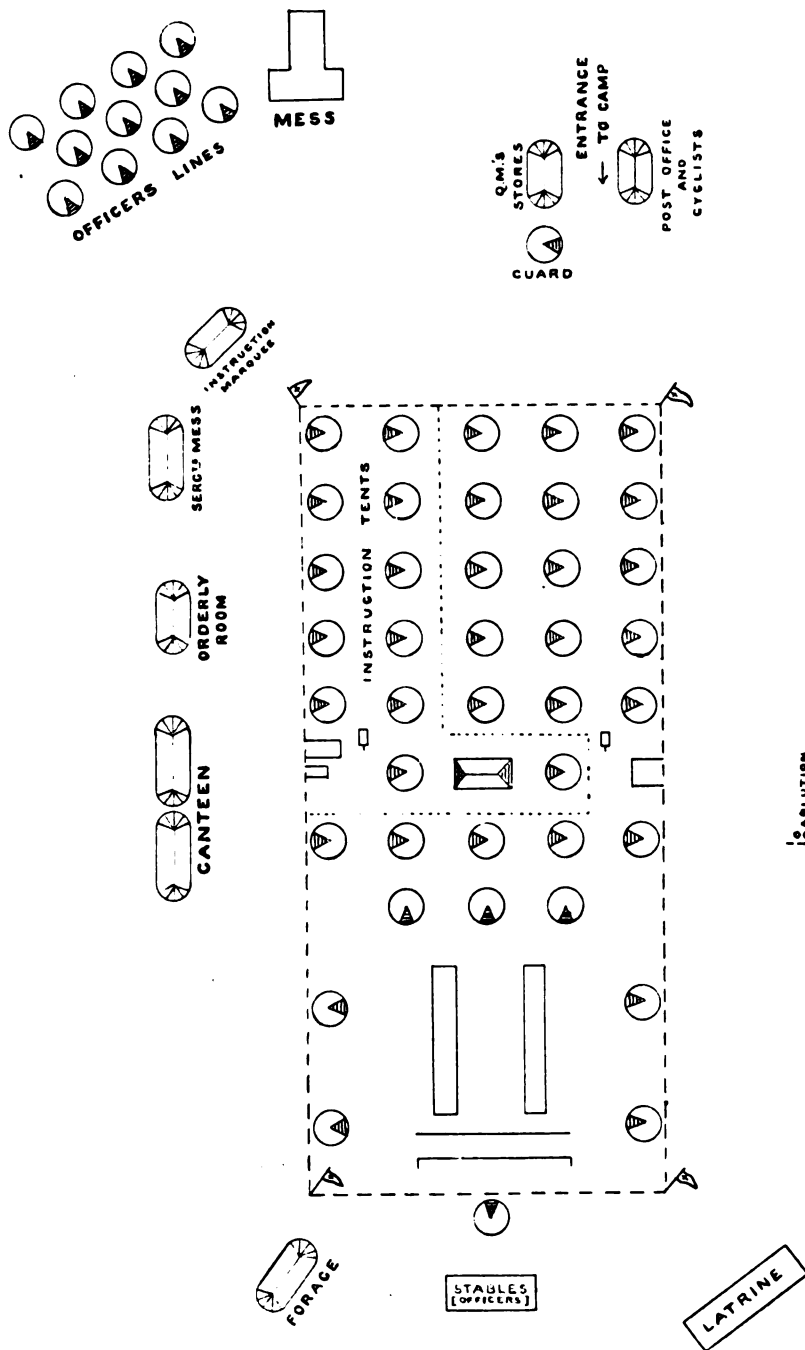


Fig. 1.

for the week from the dépôt, R.A.M.C., and the men were familiarised thoroughly with the appearance, uses, and distribution of all its various parts. For practical training the men in camp were told off into two provisional companies, and a complete scheme of work for each, embracing first aid in the field, the carriage and manipulation of sick or wounded men, and all details of hospital duties, was carefully drawn up. The transport section and the cyclist signallers were also employed in their special work.

For the success of the scheme, as drawn up, I am largely indebted to my adjutant, Capt. (now Major) Gibbard, R.A.M.C., who entered most heartily into the spirit of my plans. He looked up all army books and army forms which would be required, and drew up for each detail a sketch of the duties, with a reference to the particular army form to be used for each occasion. These duty sheets were pasted on mill-boards, and given to the men when they were told off to their posts. The success of this scheme is largely due to the care with which Major Gibbard worked out all these details. In an appendix which follows this article, is given not only a scheduled time table for the week's work, but also copies of the draft orders issued for the detail of work in the Field Hospital. These were framed so as to embrace (1) the internal working of a Field Hospital (Draft Orders I.), and (2) the steps to be taken in transferring sick by convoy to the base, and the movement forward of the hospital with its column (Draft Orders II.).

For the successful performance of (I.) the *personnel* of the Field Hospital were told off, including officer in command, other officers, quarter-master, ward-master, assist.-ward-master, steward, compounder, pack-store keeper, clerk, ward orderlies, messenger, &c. Sick and wounded were told off by tally or label, duly admitted, dieted, treated and discharged, or detained, according as the case progressed. All the prescribed army books, army forms, returns, &c., were duly filled in singly or in duplicate, and either filed as office records, or directed to their proper destinations, such as G.O.C. of the division or column, P.M.O. of the same, and others.

For the successful performance of (II.), it was assumed that a message had been received that all possible cases were to be at once sent to a named stationary hospital, and the Field Hospital cleared in view of an impending action, and the unit to move forward with its brigade. Cases were at once transferred (with all necessary army forms, &c., properly filled in) by convoy to the

stationary hospital, diets being drawn for one day. The Field Hospital was struck, packed up, and a march of a few miles made to represent the forward movement with its brigade. At the end of the march the Field Hospital was again pitched. A reference to the Draft Orders will show that A Company devoted Monday to (I.) and Wednesday to (II.), while B Company was similarly instructed on the Tuesday and Thursday.

On the Friday, the work was concluded and focussed by a field day, in which the Bearer Companies, each with its own waggons, cleared the field of wounded, conveying them *via* the collecting and dressing stations to the Field Hospital, which was pitched and prepared for their reception. The *personnel* was told off as before. The wounded were admitted and allotted to wards or tents; their kits, &c., were properly checked and lodged with the pack-store keeper, and all valuables with the quarter-master; the regulation receipts and vouchers being given for each. The wounded were seen by the officers in their wards and duly treated, whilst the more serious cases were sent to the operating tent, where a demonstration, in as graphic a manner as possible, was given, of the mode of preparation for operations, and the manner in which it would be conducted. All communications between the Bearer Companies and the Field Hospital were conducted by signal. When the field had been cleared of wounded, the fact was signalled back to the Field Hospital, and orders were then at once signalled to the Bearer Company to retire on the Field Hospital. When this was done the hospital was cleared and struck, and the combined unit marched back to camp.

The work, thus carried out, proved valuable and instructive beyond all anticipation. The *personnel* fell into their various duties with quite remarkable celerity, and the work went throughout with smoothness. Both officers and men expressed their appreciation of the interest and usefulness of the training.

The *Transport section*, with ten waggons and twenty-four horses, went by road from headquarters to Aldershot, taking two days for the journey. At the end of the week they returned to London, also by road, but taking a slightly different route. In camp the transport men seemed never idle; what with driving, riding, stables and harness-cleaning, their time was fully occupied, as will be seen from the time-table. They however, managed to find time for some useful competitions in harnessing and hooking

in and in driving with teams, as well as for wrestling on horseback. This latter proved to be one of the most popular events at the sports which were held on the Thursday afternoon. The officer in charge of the transport reports that at the end of the week the men had vastly improved both in riding and driving, and the horses were getting used to working in teams, and were both handier and more willing than when they were first taken over. Our horses are hired under a contract with a large firm, which on mobilisation would supply all the horses required for the seven units (Bearer Companies and Field Hospitals) which the Corps would furnish. They are quite unaccustomed to being ridden and driven in waggons, and require training as much as the men.

Cyclist Signallers.—A feature of the Corps, which I commend to the notice of the R.A.M.C., is the Cyclist Section. Having found great advantage from being independent of outside aid in communicating between the Bearer Company and Field Hospital, I have always encouraged the Cyclist and Signalling Section. The Cyclists are all trained in signalling, and (like the Transport, Band, Cooks, &c.) are also trained as Bearers (First Aid, &c., &c.). The work done by the Cyclists during the camp will, I think, show how such a section may be extremely useful to the Medical Unit. I therefore give a full extract from the report of the officer in charge of this section. He says :—The work of the week was arranged so as to exercise the men in duties likely to devolve upon a cyclist section attached to a Field Hospital, and particularly to exercise each member in acting upon his own initiative.

On Monday the men were instructed in the methods of measuring and dressing a Field Hospital Camp, and the same day they covered several miles of road riding as a section.

On Tuesday the men were sent out as a section, under a Corporal, to report upon a suitable site for a Field Hospital, in rear of a situation named. The Corporal sent in a very good report upon an eminently suitable site, together with a good map and written report of the routes from the standing camp to the site selected.

On Wednesday four pairs of cyclists were sent out some eight miles, along roads diverging E., S.E., and S. of Farnham, to choose and report upon suitable sites for Field Hospitals, and the approaches to them, by map and in writing ; these reports to be handed to the O.C. within two and a-half hours at a spot indicated upon the map. All the reports were handed in within six

minutes of the time appointed. The rough route-maps were quite intelligible, and the written reports showed an appreciation of the requirements of the case (*i.e.*, nature of surface, breadth and gradients of roads, size and position of camp, nature of soil, drainage, water supply, fuel, forage, supplies, telegraph, &c.). The Corporal drew a scale map of a fifth site by triangulation.

On Thursday the men competed for a prize given by a past Sergeant of the Section, setting out singly to examine the country between Normandy and Worplesden, and select the best site for a Field Hospital in the neighbourhood named, of which a map, specially prepared by the Corporal in charge of the Section, was supplied to each. The competition showed that all had a fair grasp of the requirements; one or two of the reports appeared to convey a thoroughly intelligible idea of the localities to one who had not seen the country. Some of the men exhibited great skill in riding under difficulties. During one of the morning rides two of the men brought a third man and his broken cycle into camp, a distance of six miles, at the rate of twelve miles an hour.

Throughout the week at least an hour daily was devoted to signalling practice by Semaphore; a few of the men are proficient at Morse signalling also.

On Friday, skeleton signalling stations were arranged for work with the Bearer Companies and Field Hospital in the field. Efficient signalling results were obtained with the diminished numbers.

All camp duties, including cooking for the whole number in camp, are carried out by the men of the Corps, and all work willingly and well. Although the number attending camp this year was below the average, the work done was the most important and satisfactory which we have as yet accomplished, and the efficiency of all ranks has certainly never been higher.

There is a general feeling in the Corps that a change of locality for the annual camp would be an advantage. Hitherto we have always gone to Aldershot to be near the dépôt, R.A.M.C., the resources of which have invariably been most willingly placed at our disposal. If, however, we could draw the tents and equipment for a Field Hospital for the required period there is no necessity to go to Aldershot. A bracing seaside place would be more healthy for the men, and we have to remember that for some of them this week in camp is their only holiday out of town during the whole year. Aldershot is not bracing, either physically or morally.

The military atmosphere of the place has its advantages in tending towards smartness, but this can be found also at such stations as Dover or Shorncliffe, for example.

I imagine that the scheme of training in Field Hospital work, which we carried out in camp, might possibly be found useful in the R.A.M.C., to give the *personnel* of a Field Hospital some preliminary practice in the routine work. The officers, N.C.O.'s, and rank and file of the R.A.M.C. are constantly employed in the treatment of the sick in the various military hospitals; but I presume it is not until they go on active service as a Field Hospital unit that many of them get actual experience of the necessary army books and forms, which are in constant use in the work of such a hospital. When the Field Hospital is mobilised, the *personnel* is drawn from various hospitals and stations, and the officers and men possibly meet for the first time. If the *personnel* for several Field Hospitals was detailed during peace, and each individual informed of the unit for which he was selected, and the post he would occupy on mobilisation, he would have some interest in his unit and in becoming acquainted with the special duties he would have to perform. To bring each unit together for a week (or a fortnight) in each year would cause little interference with the ordinary working of the hospitals, &c. One officer absent from a hospital for a week would hardly be felt; a wardmaster from another hospital would scarcely be missed for so short a time. The various details—one from a hospital here, another there, and so on—could go into camp as a Field Hospital for a week, and carry out each day the work detailed in such a scheme as that described. It would do the men good to have a week's fresh air; all would get to know one another pretty well in a week in camp; and at the end of the training the Field Hospital unit would be able to carry out the routine without difficulty.

This applies equally to a combined Bearer Company and Field Hospital unit. If, say, twenty such units were detailed on paper, and each was mobilised for a week every year, some of the difficulties hitherto experienced when a Field Hospital (or Bearer Company) is formed for active service would be obviated, and time would be saved in getting into the stride when they commenced work in earnest. If, in addition, the full equipment for each were kept ready, and drawn by the unit for its week's mobilisation, the practice in taking over would also save time and trouble on mobilisation for active service.

LONDON COMPANIES, R.A.M.C.V.

SCHEME OF DUTIES FOR SIX DAYS' CAMP, ALDERSHOT, AUGUST, 1908.

Day.	Company.	6 to 8 a.m.	9 to 11 a.m.	11 a.m. to 1 p.m.
Monday, August 3rd	A B Transport Cyclists	Pitch Field Hospital ... Unload Field Hospital vehicles. Take over and demonstrate Field Hospital equipment 6-7 a.m.—Riding drill. 7-8 a.m.—Grooming ... 6-7 a.m.—Cyclist drill. 7-8 a.m.—Signalling ...	Field Hospital work (for details see I. attached) Field kitchens and latrines Wagon drill ... Measurements and method of laying out Field Hospital Camp. Circular tent pitching ..	Stables. Harness cleaning instruction. Practical road training.
Tuesday, August 4th	A B Transport Cyclists	6-7 a.m.—Hospital Marquee pitching. 7-8 a.m.—Nursing helpless patients 6-7 a.m.—Cacolet drill. 7-8 a.m.—Assisting wounded off and on horses 6-7 a.m.—Riding drill. 7-8 a.m.—Grooming ... Pitching Operating Tent	Field kitchens and latrines Field Hospital work (for details see I. attached) Wagon drill ... 9-10 a.m.—Signalling	Stables. Harness cleaning instruction. 10 a.m.—1 p.m.—Road training.
Wednesday, August 5th	A B Transport Cyclists	6-7 a.m.—Cacolet drill. 7-8 a.m.—Assisting wounded off and on horses 6-7 a.m.—Marquee pitching. 7-8 a.m.—Nursing helpless patients 6-7 a.m.—Riding drill. 7-8 a.m.—Grooming ... Signalling. Cycle drill	Field Hospital work. Dispatch of sick convey Bearer Company work over rough ground ... Sick convey. Field Hospital work (for details see II. attached) Judging distance. Judging time	Strike and move Field Hospital (for details see attached). Cacolet drill. Road sketching. Writing reports.
Thursday, August 6th	A B Transport Cyclists	Wagon drill ... 6-7 a.m.—Nursing helpless patients. Bed-making, drawsheets. Method of making up bedding of patients marked "up." 7-8 a.m.—Temperature charts, diet sheet, &c. Strike, pack, un- pack, and pitch Hospital Marquee Riding drill Signalling	Bearer Company work over rough ground ... Sick convey and Field Hospital work (for details see II. attached) 9-10.15 a.m.—Competition in harnessing and hooking in Competition for Sergt. Laurie's prize	Marquee pitching. Duty with Corps (Field Hospital and Sick convey). 2 p.m.—Driving competition.
Friday, August 7th	A, B, and Transport and Cyclists	Bearer Company and Field Hospital (Scroggs Bottom and Long Valley). B Company Field Hospital personnel. The Transport Officer will parade with 5 ambulance waggons, 4 G.S. waggons, 1 supply cart, 1 water cart. The Signallers and Cyclists will keep up communication between Bearer Company and Field Hospital in the field.	Parade 8 a.m. A Company to furnish personnel of one Bearer Company.	
Saturday, August 8th	A, B, and Cyclists } Transport	Strike Camp, pack, &c. Parade at 8.45 a.m., to return to London by route march		

51, Calthorpe Street,
July 1st, 1908.

It is quite possible that this is all arranged for at present. Mobilisation for manœuvres is not the same thing, for the constant movement and the necessity for treating actual patients does not allow of the requisite thoroughness in instruction. In any case our experience of a short week's trial of the scheme has convinced me, and all who participated in the training, of the wisdom of such a plan, and the immense advantage to be derived from practising the work together. I have long wished to carry out the scheme which has proved so successful this year, but have never hitherto been able to get the necessary tents and equipment for the full week. To pitch a Field Hospital and strike it the same day does not give much opportunity for instruction in the working of the hospital ; you need to live in it for a time.

The remainder of the work set forth in the Time Table represents the routine work in camp for many years ; but the Field Hospital scheme makes this year's camp especially important, as it initiates a detail of training which is most valuable, interesting and instructive. I am convinced that it will form a feature of every succeeding camp.

APPENDIX.

DRAFT ORDERS (I.).

On Monday, Aug. 3, "A" Provisional Co.'y. } Will parade at 9 a.m.
 On Tuesday, Aug. 4, "B" Provisional Co.'y. } for Field Hospital work.
 The following will be the *personnel* for Monday (A Company) :—

Officer in charge—
Officers doing duty—
Quartermaster—
Wardmaster—
Assistant Wardmaster—
Compounder—
Steward—
Pack-storekeeper—
Clerk—

Ward Orderlies—

Washerman—

Cooks—

Messenger—

Privates * * * * * will be paraded at 8.50 a.m. as patients by the Camp Orderly Sergeant at the Orderly Room Tent, each man bringing with him his kit bag (containing a few articles of his kit), and a rifle to be given to him by the Sergt.-Major. Tickets will be given out by the Adjutant showing diseases or injury, and the Orderly M.O. will see the cases, dealing with them in the manner laid down in para. 687, A.M.S. Regs. (Duties of Officers in Medical Charge of Units in the Field). [Note, the morning sick of the Corps will be seen at the same time by the O.M.O.]

Those patients marked "Hospital" will be marched to the Field Hospital (taking their kits, arms, &c., with them) by the Camp Orderly Sergeant, so as to arrive there as soon after 9 a.m. as possible, to be seen by the officer in charge of the Field Hospital, the Orderly Sergeant returning to his duty in camp after handing over the cases.

The Field Hospital will be divided into surgical and medical divisions.

In addition to the operating tent and surgery, tents will be told off for the office, quartermaster, and pack-store respectively; these tents will be labelled, so that those doing duty may be able to find them easily.

The officer in charge will first explain briefly (to patients as well as the hospital *personnel*) the chief points connected with a Field Hospital, such as number of patients equipped for, site, camp, *personnel*, equipment, clothing, dieting, &c.

Officers, N.C.O.'s and men will be told off to their respective posts, and will be given copies of their duties, with which they will make themselves acquainted.

The compounder will familiarise himself with the drugs and other contents of the Field Medical and Surgical Panniers, and the cook with the portable stove and other articles which he would have to use on Field service.

[Note—The Commanding Officer will visit the hospital during the morning and question each individual regarding his duties.]

At 10 a.m., or before if possible, patients will be admitted, their kits dealt with, &c.

At 10.15 a.m. officers will go round their tents, prescribe, order any extras that may be necessary, and give instruction to N.C.O.'s and men in their duties, the nature, care and nursing of each case, special reference being made to the disposal of excreta and discharges from enteric, dysentery, and other such cases.

Prescription books will be sent to the surgery and given to the compounder, books containing lists of extras ordered will be sent to the steward.

A slip and necessary forms will be attached to the copies of duties given to the quartermaster, wardmaster, steward, compounder, pack-storekeeper

358 *The Work of a Volunteer Unit, R.A.M.C., in Camp*

and clerk, stating what forms are to be made out by each ; these forms will be carefully prepared and submitted to the officer in charge at 11.45 a.m. and 12.15 p.m. These, together with the "admission and discharge books," and all other books and forms used during the morning, will be submitted by the officer in charge to the Commanding Officer at 2.30 p.m.

At 11.30 a.m. medical officers will bring to the notice of the officer in charge such patients under their care as they may consider (a) fit for duty, or (b) not likely to be fit for duty within a short period. Should the officer in charge concur, necessary steps will be taken for the discharge of (a), the counterfoil from the pack-store check book (containing list of their kit) will be obtained from the quartermaster, the kit will be drawn from the pack-store, and money and valuables will be returned by the quartermaster.

The officer in charge will prepare for submission to the P.M.O. of the division a nominal roll on A.F.A. 36, of those (b) who are not likely to become efficient within a reasonable time, requesting instructions regarding their disposal. These papers will be shown to the C.O. at the same time as those mentioned above.

At 11.45 a.m., such of the hospital *personnel* as are available will be assembled in the operating tent, where (an officer named) will demonstrate the surgical instruments in common use, the method of preparing these and the patient for operation, the necessity for absolute surgical cleanliness of all persons having anything to do with operations or the dressing of wounds, and the antiseptic precautions to be taken.

Patients coming under the heading (b) above, also the other patients when they have got their kits ready for discharge, will attend this demonstration. At 12.25 p.m. the class will be dismissed, and N.C.O.'s and men return to their respective posts in hospital.

At 12.30 p.m. the men discharged will be paraded outside the office tent by the wardmaster for inspection by the officer in charge (or an officer deputed by him), who will ascertain whether they are in possession of their kits. They will then be marched back to the orderly-room tent, handing over rifles or any other articles they may have received to the Sergeant-Major, and be dismissed.

Before dismissing the Field Hospital *personnel*, the officer in charge will cause all equipment and copies of "duties" to be collected ; Captain and Quartermaster *** will report himself to the officer in charge at 12.30 p.m., to assist and take charge of the same.

DRAFT ORDERS (II.).

A (and B) Provisional Co. will parade at 9 a.m. on Wednesday, Aug. 5 (and Thursday, Aug. 6), to continue Field Hospital work.

The following will be the *personnel* :—

Officer in charge—

Officers doing duty—
Quartermaster—
Wardmaster—
Assistant Wardmaster—
Compounder—
Steward—
Pack-storekeeper—
Clerk—

Ward Orderlies—

Washerman—
Cooks—
Messenger—

Privates * * * * * will be paraded at 8.50 a.m. as patients, by the Camp Orderly Sergeant at the office tent, each man bringing with him his kit-bag (containing a few articles of his kit, and a rifle to be given to him by the Sergeant-Major.

The Orderly Medical Officer will see the patients, and deal with them as laid down in para. 687 A.M.S. Regs., after which they will be marched to the Field Hospital to be seen by the officer in charge.

The officer in charge will first explain the method of transferring sick and wounded to the base, and of moving a Field Hospital with patients.

The *personnel* and patients will then be told off to their tents, necessary entries made in admission and discharge books, kits taken over by the pack-storekeeper, &c.

At 10 a.m. orders will be received by the officer in charge for all sick and wounded not likely to be fit for duty within a short period, to be sent immediately by sick convoy to No. 10 General Hospital, K———y, the hospital tents to be struck and moved forward with the troops, an engagement being expected.

On receipt of these orders the officer in charge will at once arrange for the dispatch of the sick convoy, detail the necessary staff, and see that the rolls and certificates required by regulation are properly prepared, kits, &c., taken over, &c.

The quartermaster will make out necessary requisitions on the officer in charge of supplies for rations and forage for one day. These requisitions, together with all other books and forms used, will be submitted to the Commanding Officer at 2.30 p.m. for perusal.

360 *The Work of a Volunteer Unit, R.A.M.C., in Camp*

The patients for the sick convoy will be loaded in the ambulance waggons.

In the meantime the operating tent, surgery, office and ten patients' tents will be struck, packed and loaded, together with the Field Hospital equipment, in the G.S. waggons.

The loads will be in accordance with Section V., Field Service Manual A.M.S., the bell tents being put in a separate cart, any tents in excess of the proper load being left behind.

The Field Hospital with sick convoy will be marched off at 11 a.m., under the command of the officer in charge, returning to the Field Hospital Camp by 11.45 a.m.

On return to camp, the waggons will be unloaded and the transport returned to their lines; the remainder of the Field Hospital *personnel* will repitch the tents, and replace the Field Hospital stores in the operating tent. Equipment and copies of duties will be handed over to Captain and Quartermaster ***, who will report himself to the officer in charge at twelve noon.

Patients will be marched to the orderly room tent, and hand over rifles (and any other articles which were given to them) to the Sergeant-Major before being dismissed. The O.C. Transport section will parade at 10.15 a.m. at the Field Hospital Camp, with twenty-two horses (ten pairs and two single), ready harnessed, and report to the officer in charge for orders.

NOTES FOR MONDAY AND TUESDAY FIELD HOSPITAL WORK.

8.30 a.m. Rifles ready for patients, also valuables.

Tickets showing disease or injury for patients.

Company sick reports.

Large labels (cards) marked "Surgery," "Office," "Quartermaster," "Packstore."

Copies of duties for *personnel*, with slip of forms to be filled in.

Admission and discharge, and other books for the office tent.

M.O.'s to make mistakes in prescriptions and order drugs not in Panniers (tinct. digitalis, spts. etheris nit., tr. nucis. vom., acid HCl. dil. &c.).

Chairs and tables, ink, &c., for office tent.

Pencils for officers, wardmaster, &c.

If spare time :

Admit a casualty later (11 a.m.). At 10.45 label a case "Died at 10.50 a.m."

Show equipment.

Operation case (prepare tables, put out and show instruments, teach importance of cleanliness and use of antiseptics, &c. ; show how to dress a wound).

Laws of Geneva Convention.

NOTES FOR WEDNESDAY AND THURSDAY FIELD HOSPITAL WORK.

Labels for patients { (a) For transfer to General Hospital { Lying down.
 { as not likely to be fit for duty soon { Sitting up.
 { (b) Likely to be fit for duty in a day or two.

Rifles.

Company sick report.

Orders relating to sick convoy.

Duties, also necessary forms for office tent.

Orders made out by C.O. for removal of the hospital, &c., stating
how many days' march for sick convoy.

Label an Orderly as a casualty (gunshot wound of chest) on
the march, and see that last para. of sick convoy is com-
plied with.

THE BACILLUS COLI COMMUNIS : CONSIDERED AS AN
INDICATION OF SEWAGE CONTAMINATION OF WATER
SUPPLIES.

By MAJOR W. H. HORROCKS.
Royal Army Medical Corps.

THE bacillus coli communis has been regarded as one of the most important indications of sewage contamination of water supplies, but unfortunately much confusion exists as to the cultural characteristics which are to be considered diagnostic of this particular organism. Collating the results of studies of three hundred coliform colonies isolated from normal and pathological human dejecta, I have been able to arrange the bacilli, thus isolated, in the six groups shown in table A. Before we can accept any one of these groups as definitely indicating sewage contamination it will be necessary to show : (1) that the cultural reactions are stable, not only when the bacteria are grown on nutrient media, but also after they have gained access to water and soil ; (2) that no other bacteria exist in virgin soils and unpolluted water, which might be confounded with them ; (3) that these bacteria are peculiarly characteristic of human fæcal material.

It is well known that the reactions of culture media greatly influence the growths of certain micro-organisms, notably the *B. typhosus* and *S. cholerae asiaticæ*. In order to ascertain whether the same held good for the colon bacteria, media having the following reactions were prepared :—

(a) Media made neutral to litmus and then 4 cc. of N. alkali added per litre.

(b) Media made faintly alkaline to phenol-phthalein and then 15 cc. of N. acid added per litre.

(c) Media made neutral to phenol-phthalein and then 10 cc. of N. acid added per litre ; or rather this amount of alkali was deducted from the quantity required to make the total amount of the medium neutral to phenol-phthalein.

The bacilli in the various groups were then tested on these media : it was noticed that in gelatine having the first reaction the growths in plate cultures were often not typical ; the surface colonies not uncommonly failed to grow out in the characteristic

thin bluish films, but remained thick and opaque and often assumed a more or less star or rosette-like appearance. In media having the third reaction this was not observed and typical surface colonies appeared. In agar and in broth sugar media, &c., the organisms behaved in a characteristic manner, no matter whether the media were made according to the first, second or third reaction.

We can now proceed to examine the variability of the cultural reactions of the bacilli shown in table A, when the organisms are subcultured on standard media, and discuss the value of the various tests. In gelatine plates having the third standard reaction, the bacilli in groups I., III., IV., V., and VI., grow on the surface as thin, transparent, bluish-white colonies with irregular margins. Under a low power a vine-leaf venation may be marked, but often only a finely granular surface is seen; the gelatine is never liquefied. After preservation for a week or ten days the colonies still have a smooth appearance, they never show a wrinkled surface. The colonies of group II. are thicker and more opaque than those of the other groups.

A stroke culture on a *recently* prepared gelatine slope appears as a thin bluish-white growth wider below than above, the margin is usually irregular and the surface never shows a corrugated or wrinkled appearance.

The growths in gelatine are important; it should be noted that the medium is never liquefied and the surface growths are never wrinkled.

The fermentation of carbohydrates is one of the most important and most stable of the differential tests. As regards glucose it must be admitted that many bacteria ferment this sugar with the production of both acid and gas; but the bacilli in groups I. and II. always give rise to a marked amount of acid, usually equalling 12 to 14 per cent. $\frac{n}{10}$ acid, after twenty-four hours' incubation at 37° C. Also only one-third to one-half of the gas produced is absorbed by caustic potash. In unpolluted soils and water there are many organisms suggestive of *B. coli* which also produce acid and gas from glucose, but a large number of them can be at once excluded from the *coli* group by the fact that the acid produced is always small in amount, not equalling more than 3 to 5 per cent. of $\frac{n}{10}$ acid, and two-thirds and possibly more of the gas produced is absorbed by caustic potash.

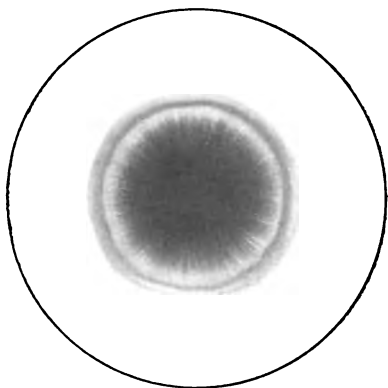
Fermentation of lactose is a much more important differential

test than the fermentation of glucose; the bacilli in groups I. and II. always produce both acid and gas after twenty-four hours' incubation at 37° C., the amount of acid formed being slightly less than produced from glucose. It will be noticed that in the table only the bacilli in group I. (*B. coli* of Escherich), and those in group II. (*B. lactis aërogenes*) produce *both* acid and gas from lactose, the organisms in the remaining groups either ferment this sugar as far as the lactic acid stage, or fail to act on it at all. In my experience, this formation of acid and gas from lactose is remarkably constant in the case of all the organisms shown in groups I. and II.

Fermentation of cane sugar is not of much value from a diagnostic point of view: about half the organisms in the first group ferment this sugar with the formation of both acid and gas, the remaining members, including a subculture from a growth isolated by Escherich, fail to act on it at all, so one cannot regard this fermentation as an essential characteristic of the group.

Fermentation of starch is a marked characteristic of group II., but the true *B. coli* of Escherich has no action on this carbohydrate.

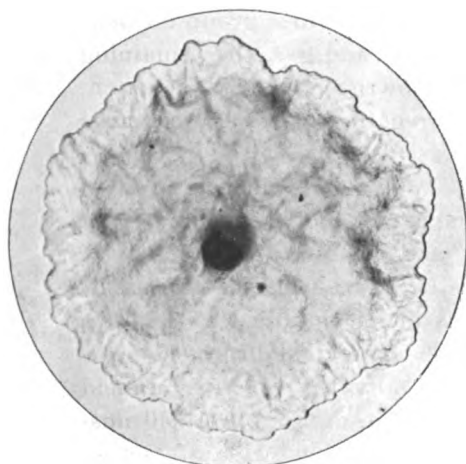
Reduction of nitrates to nitrites and ammonia is effected by all the organisms in the table, and, as many bacteria in virgin soils and pure water also have the same reducing action, this test has little differential value. The formation of acid in litmus-whey is a very important indication, and especially the amount of acid which is found after seven days' incubation at 37° C. In litmus-whey as ordinarily prepared there is a large quantity of lactose combined with a very small quantity of another sugar, probably of the nature of galactose. The bacilli in groups I. and II. have the power of fermenting both these sugars, and the quantity of lactose being large, the production of acid goes on steadily for several days. Many bacilli, resembling these groups in some way, fail to act on the lactose but ferment the galactose, so with these organisms a small production of acid is seen after twenty-four hours; in a little time, all the sugar being consumed and an alkali being formed probably associated with the decomposition of proteid material, the acid is neutralised, and at the end of seven days the medium may show a distinctly alkaline reaction. This formation of acid, which is later neutralised by the production of alkali, is a marked characteristic of the bacillus described by Gärtner (*B. enteritidis*), but in my experience it is not seen in connection with the bacilli in the various groups, with the exception of No. VI.



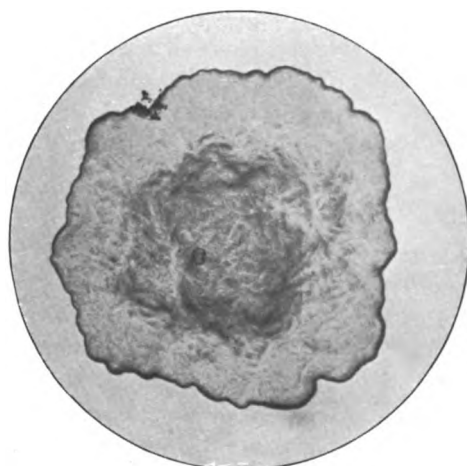
B. Coli colony on an unfavourable medium.



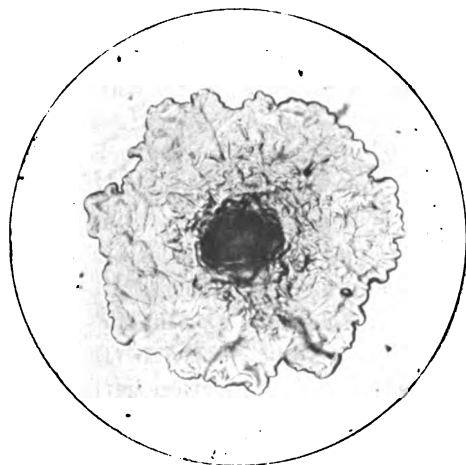
Colony of B. Coli (Escherich) after six weeks in Thames water.



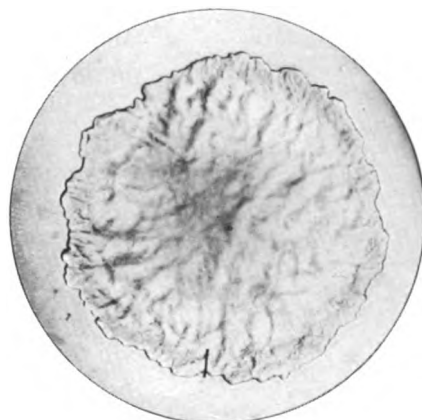
Colony of an organism from unpolluted soil.



Colony of an organism from unpolluted water.



Colony of B. Coli from rabbit



Colony of B. Coli from sheep.

Illustrating Major HORROCK's paper.



The colour change in neutral-red is a useful test, but the time required to produce the fluorescence and the yellow colour appears to be variable. The colour change is not absolutely diagnostic of groups I. and II., as bacilli belonging to the *Proteus* species also produce it. Still a bacillus which does not cause the colour change after incubation for a week at 37° C. is certainly not the *B. coli* of Escherich.

The next three tests, *i.e.*, the formation of indol, coagulation of milk and growth on potato, are the classical ones by which at one time the *B. coli* was mainly diagnosed. At present the same value is not attached to these tests. The formation of indol was early found to be very variable and to depend to a great extent on the medium in which the organism was growing. Béré found that the formation of indol was greater with a pure peptone than with any other form of proteid. Furthermore, the *B. coli* formed indol from proteids peptonised by each of the various proteolytic enzymes, but trypsin formed a peptone which gave the most indol. Peptones prepared by digesting casein with trypsin gave a much larger amount of indol than acid or alkali albumin. Kruse observed that when bouillon contained more than 0.25 per cent. sugar the indol reaction was not obtained, and many bacteriologists now recommend that the suspected organisms be grown in peptone and salt solution, a medium quite free from sugar, and the test applied after incubation for seven days at 37° C. According to Peckham, in solutions containing equal amounts of dextrose and peptone the fermentation of the sugar always takes precedence over the proteolytic action. The fermentation of glucose and lactose is completed before the production of indol takes place, and a large part of the peptone remains unchanged. This is due to the exhaustion of energy caused by the breaking up of the sugar, and not to the excess of acid formed, for, when an amount of lactic acid equivalent to that produced is added to the medium in which the organisms have been inoculated, it does not entirely prevent the formation of indol. Dextrose, however, when added to the extent of 0.5 per cent., abolishes the production of indol. Theobald Smith, considering that peptone forms a poor nutrient medium for many bacteria, suggests that the organisms to be tested should be grown in dextrose-free bouillon, prepared by fermenting beef infusion with a standard *B. coli*. There is no question that the formation of indol is more marked and more rapidly developed

in Smith's medium than in peptone, but I have not been able to show that an organism which does not produce indol in peptone and salt solution will necessarily give the reaction in Smith's bouillon. Peckham tested the indol production of twenty-five typical colon bacilli in Dunham's peptone solution and in alkali peptone bouillon, the organisms being carried through several generations each of three days' duration. It was found that the greatest quantitative production occurred in alkali-peptone after about seven days and in the second generation. Atypical bacilli were then carried through several generations, and all of them gave a decided indol reaction after fourteen to twenty days' incubation at blood heat. I have repeated Peckham's experiments, but all my atypical colon bacilli, which failed to produce indol in peptone solution, also gave no indication of indol after many passages through Peckham's alkali albumen. A typical *B. coli* of group I., grown on an acid medium or seeded in water containing little pabulum, may become temporarily enfeebled and fail to break up proteids with the formation of indol, and such an organism may be restored to its original vigour by passing it through a rich nutrient medium, but I have never been able by any treatment whatsoever to cause an organism, which when first isolated from dejecta showed no signs of indol formation, to assume this faculty.

The coagulation of milk appears to be associated with the formation of acid and the production of an enzyme; it does not necessarily follow that an organism which rapidly produces a considerable quantity of acid by fermentation of lactose will therefore quickly coagulate milk. As a rule, milk is coagulated by the bacilli in groups I. and II. after forty-eight to seventy-two hours' incubation, but when the bacillus is enfeebled by unfavourable surroundings the coagulation may not take place for seven to ten days.

The growth on potato varies considerably in its appearance. Sometimes there is a marked yellow colour, at other times the growth is practically colourless, and only a moist, glistening film shows the presence of the bacilli.

Proskauer and Capaldi's media, though of great value in the diagnosis of the *B. typhosus*, are not of the same importance when differentiating the varieties of *B. coli*. Still the bacilli in group I. always give rise to an acid reaction in No. I. and a neutral or alkaline reaction in No. II. medium.

The formation of a scum or surface pellicle on broth is regarded

as of some importance, but in my experience it is too variable to be considered a critical test. Growth under anaerobic conditions should always be examined, as I have found several bacteria conforming in many ways to the coli type unable to develop under anaerobic conditions.

The morphology may vary ; sometimes a form closely resembling a coccus, at other times a true bacillus is seen. Occasionally the short forms adhere together and form a chain closely resembling a streptococcus. As regards motility, some of the bacilli in group I. were found highly motile when first isolated, others showed only a slight rotatory movement. The bacilli in all the groups were decolourised by Gram.

We have now seen how far the cultural reactions may vary when the organisms are grown on ordinary nutrient media. It is, however, necessary to know if the bacilli maintain their characteristics when planted out in soil, and especially after immersion in water. In order to test this point, I planted out emulsions of the organisms in group I. in unsterilised unpolluted deep well waters, in unsterilised water from the New River Company, in sterilised sewage and in sterilised polluted water taken from the Thames at Waterloo Bridge. In all cases the emulsions were made from recent growths on agar slopes, care being taken not to remove any of the nutrient medium, the bacilli being suspended in some of the water under investigation. The emulsions were then added to flasks of the water, which were kept at the laboratory temperature. In the case of the deep well waters the organisms were isolated and the cultural reactions tested after thirty-one days, nine weeks, and three months had elapsed from the date of inoculation. After thirty-one days there was absolutely no change in any of the reactions shown in table A ; but after nine weeks and three months the indol formation was feeble as compared with the original culture, tested at the same time and in the same medium ; the colour change in neutral red was retarded and the coagulation of milk was slightly delayed. The same changes were noticed in the organisms isolated from the New River Company water after a period of two months, and in the organisms isolated from the sterilised sewage and sterilised Thames-water after periods of two and three months respectively. Having seen the variations produced in *B. coli* by immersion in water, it was of great interest to ascertain whether similar or greater changes

would be produced by planting out the organism in soil. When studying canal, river and shallow well waters I have often been surprised at the number of organisms which, growing atypically in gelatine plates, failed to produce the characteristic fermentations, usually the fermentation of lactose being absent. A natural explanation seemed to be that life in soil had a greater influence on the vital activity of *B. coli* than immersion in water. In order to ascertain whether this was really the case, I planted out agar emulsions of *B. coli* (Escherich) on various samples of soil and examined the cultural reactions from time to time. A rich loam, which had been manured but at the time of the experiment was free from *B. coli*, was selected for the first experiment. After the addition of the emulsion the soil was kept at the laboratory temperature. The *B. coli* was easily isolated up to the end of a month, and when subcultured it was found quite unchanged. The colonies in gelatine plates were as typical as ever, and the fermentation of glucose and lactose, the coagulation of milk, the formation of indol and decolorisation of neutral-red, occurred exactly at the same time as the control culture preserved on an agar slope. The next experiment was made with a virgin loam, the same procedure being followed; at the end of six weeks the *B. coli* was isolated and responded in every detail when subcultured. The third experiment was made with a virgin sandy soil obtained in Gibraltar; after inoculation the specimen was preserved in the laboratory cupboard, no water being added to it. Tested after sixty days the *B. coli* was isolated quite unchanged in all its reactions. This result was surprising, the temperature of the room averaging about 80° F. during the experiment, the soil became very dry, and I expected the *B. coli* would either rapidly die out or show signs of degeneration. Houston, when summing up the results of his experiments on the inoculation of soil with sewage, stated that, "although there was a distinct indication of a decided decrease in the number of coli-like microbes, it could not be said, even after eighty days, that *B. coli* had entirely disappeared from the soil. The less typical forms seemed to persist longer than the more typical, but possibly the explanation may be that the typical *B. coli* lost some of its original characters during its sojourn in soil." Houston's experiments were carried out during autumn, winter and spring, when the soil is apt to remain permanently moist, and he thought that had the experiments been made during the

TABLE A.

	Group I.	(b)	Group II.	Group III.	Group IV.	Group V.	Group VI.
Colonies in gelatine plates	Thin bluish surface colonies, with an irregular margin, gelatine not liquefied	The same as (a)	Colonies thicker and more opaque than Group I.	The same as Group I.	The same as Group I.	The same as Group I.	The same as Group I.
Gelatine stroke ...	Broad thin growth, with an irregular margin	do.	more opaque than Group I.	do.	do.	do.	do.
Gelatine stab ...	Surface growth like the colonies, thick white growth along the stab	do.	Surface growth thicker than Group I.	do.	do.	do.	do.
1 per cent. Glucose-peptone (37°C.)	Gas and acid in 24 hours ...	do.	The same as Group I.	Acid and gas, 24 hours	Acid and gas, 24 hours	Acid and gas, 24 hours	Acid, but no gas
1 per cent. Lactose-peptone (37°C.)	do.	do.	do.	Acid slowly formed, no gas	Unchanged after 7 days	Unchanged after 7 days	Unchanged after 7 days
1 per cent. Cane-sugar-peptone (37°C.)	Unchanged after 7 days ...	do.	Acid and gas in 24 hours	Unchanged after 7 days	do.	do.	do.
1 per cent. Starch-peptone	do.	do.	Acid and gas formed	do.	do.	do.	do.
Nitrate-broth, 7 days at 37°C.	Reduced to NO ₂ ...	Reduced to NO ₂	Reduced to NO ₂	Reduced to NO ₂	Reduced to NO ₂	Reduced to NO ₂	Reduced to NO ₂
Litmus-whey, 24 hours at 37°C.	Acid distinct ...	Acid distinct ...	Acid distinct ...	Acid distinct ...	Acid distinct ...	Unchanged	Acid slight
Litmus-whey, 7 days at 37°C.	Acid very marked ...	Acid very marked ...	Acid marked ...	Acid marked ...	Acid distinct ...	Alkaline ...	Neutral
Neutral - red (glucose shake)	Changed to yellow ...	Changed to yellow	Changed to yellow	Changed to yellow	Colour unchanged	Colour unchanged	Colour unchanged
Peptone and salt solution, 7 days at 37°C.	Nitroso-indol reaction marked	Nitroso-indol reaction marked	Nitroso-indol reaction marked	Nitroso-indol reaction distinct	Nitroso-indol reaction distinct	Nitroso-indol reaction marked	Nitroso-indol reaction trace
Milk (37°C.) ...	Coagulated in 72 hours ...	Coagulated in 72 hours	Coagulated in 72 hours	Coagulated, 14 days	Unchanged, 14 days	Unchanged, 14 days	Coagulated in 7 days
Potato (37°C.) ...	Coloured growth ...	Coloured growth	Coloured growth with gas bubbles	Moist, colourless growth	Coloured growth	Coloured growth	Coloured growth
Proskauer and Capaldi's media	(No. 1. Growth, reaction acid, 24 hours No. 2. Growth, reaction alkaline, 24 hours)	The same as (a)	The same as Group I.	The same as Group I.	Growth re-action, acid 24 hours	Growth, reaction unchanged	Growth, reaction unchanged
Agar slope (37°C.) ...	Greyish-white growth ...	The same as (a)	Greyish-white, tenacious growth	The same as Group I.	The same as Group I.	The same as Group I.	The same as Group I.
Broth (37°C.) ...	Diffuse growth, slight surface pellicle	do.	The same as Group I.	Growth, no pellicle	The same as Group III.	The same as Group III.	The same as Group III.
Anaerobiosis (Buchner's tube)	Growth ...	Growth ...	Growth ...	Growth ...	Growth ...	Growth ...	Growth
Morphology ...	Small, feebly or distinctly motile bacilli	The same as (a)	Small, non-motile bacilli	Small, feebly motile bacilli	The same as Group III.	Small motile bacilli	Small, feebly motile bacilli
Staining reactions ...	Decolorised by gram... ..	Decolorised by Gram	Decolorised by Gram	Decolorised by Gram	Decolorised by Gram	Decolorised by Gram	Decolorised by Gram

NOTE.—According to my titrations : Slight acidity = 3 to 4 per cent. $\frac{N}{10}$ alkali ; Distinct acidity = 8 to 9 per cent. $\frac{N}{10}$ alkali ; Marked acidity = 12 to 14 per cent. $\frac{N}{10}$ alkali ; Very marked acidity = 20 to 25 per cent. $\frac{N}{10}$ alkali.

dry summer months the disappearance of *B. coli* from the soil would have been more rapid and relatively more complete. My experiments do not support Houston's belief that typical *B. coli* may become converted into an atypical variety by a prolonged sojourn in soil. It cannot be doubted that *B. coli* tends to die out in soil, and my experiments showed that its greatest duration of life was about ninety days. The practical outcome of my work is that water percolating through a soil polluted with *B. coli*, even ninety days previously, will show the same organism with all its usual characteristics as evidence of the contaminated source from which it has come. We have now seen that the bacilli in group I. undergo very little change after they have assumed a vegetative existence. The following characters are absolutely stable, *i.e.*, non-liquefaction of gelatine, fermentation of carbohydrates, acid production in litmus-whey, reduction of nitrates, growth under anaerobic conditions, morphology and staining reactions. The following are slightly variable, *i.e.*, time required to coagulate milk, time required for the colour change in neutral-red, colour of the growth on potato and power of producing indol.

With regard to the effects produced on the bacilli in the sewage groups III. to VI., by immersion in water and life in soil, it is not easy to determine them experimentally, for, as I shall show presently, many organisms exist in nature which have a close resemblance to the sewage groups. The few experiments that I have been able to make appear to indicate that these sewage bacilli have a vegetative existence of about the same duration as the bacilli in group I.

We have now to consider the second question: are there any micro-organisms existing in virgin soils and unpolluted water which resemble the bacilli in the groups I. to VI. ?

Up to the present time I have not been able to find in virgin soils and unpolluted waters any bacilli which display *all* the characteristic reactions of the bacilli in group I. There are, however, organisms which might be mistaken for this group if care were not taken to work out the stable reactions given above. An organism I have occasionally met with in surface waters gives all the reactions of group I. with the exception that the surface colonies on gelatine plates assume a folded or wrinkled appearance, when the plates are incubated for about five days at 22° C. The same wrinkled growth is seen in gelatine stab, and stroke cultures. I have called this organism the *B. sulcatus gasoformans*; its culture reactions are given in detail on Table B.

TABLE B.

Cultural characteristics and morphology of B. Sulcatus Gasoformans.

Colonies in gelatine plates	The surface colonies appear as bluish-white films with irregular margins; under a low power a finely granular or slightly ridged surface is seen. The gelatine is never liquefied. After five to seven days' incubation the surface of the colonies becomes folded or corrugated.
Gelatine stroke ...	At first a growth exactly like <i>B. coli communis</i> appears, later the film acquires a corrugated or folded appearance.
Gelatine stab ...	The growth on the surface exactly resembles the surface colony described above; there is a white growth along the line of inoculation.
One per cent. glucose peptone	Acid and gas produced after 24 hours' incubation at 37°C.; the acid = 15 per cent. $\frac{N}{10}$. Of the gas produced only about one-third is absorbed by caustic potash.
One per cent. lactose peptone	Acid and gas produced after 24 hours' incubation at 37°C. the acid = 10 per cent. $\frac{N}{10}$.
One per cent. cane-sugar	Unchanged.
One per cent. starch	Unchanged.
Nitrate - broth, 7 days at 37°C.	Reduced to nitrites; the reduction is seen after 24 hours.
Litmus-whey... ..	After 24 hours at 37°C. marked acid. After 7 days at 37°C. acid = 20 per cent. $\frac{N}{10}$.
Neutral red	After 3 days colour changed to yellow.
Peptone and salt solution	After 7 days at 37°C. nitroso-indol reaction obtained.
Milk	Coagulated after 24 hours at 37°C.
Potato	Light yellow growth.
Proskauer and Capaldi's media {	No. I. acid, after 24 hours at 37°C.
Agar slope	No. II. faintly alkaline, after 24 hours at 37°C.
Broth	Greyish-white growth.
Anaerobiosis	Diffuse growth, no pellicle on the surface.
Morphology	Growth.
Staining reactions	A small, slightly motile bacillus. Decolorised by Gram. Stained with ordinary basic dyes.

Another group of bacilli produce all the classical signs of *B. coli* such as coagulation of milk, formation of indol, colour change in neutral red, reduction of nitrates and non-liquefaction of gelatine. The colonies, however, always remain circular and more or less opaque and granular when viewed by transmitted light, but their great distinguishing characteristic is their action on carbohydrates. They produce both acid and gas from glucose and lactose, like the typical *B. coli*; but the gas formation is always very intense; after twenty-four hours' incubation at 37° C. Durham's tube will be found nearly filled with gas, which is nearly all absorbed by caustic soda, and the acid production will be found to be small, usually only equalling about 5 per cent. $\frac{N}{10}$ alkali. Probably these organisms are closely allied to *B. cloacæ* described by Jordan. As a result of my experience I have been led to the conclusion that

the bacilli in group I. (coli of Escherich), strictly defined as above, are peculiarly characteristic of faecal contamination.

With regard to the organisms in groups III. to VI. the position is very different. I have frequently isolated from virgin soils and unpolluted waters bacilli which it is almost impossible to distinguish from the organisms in these groups. The descriptions of some of these organisms given in Table C will show how great the similarity is between these various microbes.

It is evident that, if we accept the organisms in the sewage groups III. to VI. as indications of sewage contamination, we are in a difficult position, for, though there are slight differences between the organisms in Table C and those in the sewage groups, yet the resemblances are so great as to render their differentiation by no means an easy matter. I have sought in vain for a test which would enable a diagnosis to be rapidly made. With this end in view I carefully examined the fermentation changes produced in galactose, maltose, mannite, inulin and glycerine, but failed to obtain any material help from these reactions. The bile-salt glucose broth of MacConkey and neutral-red agar and broth media having been suggested as rapid methods of detecting *B. coli* in polluted waters, were subjected to careful tests. With regard to the bile-salt broth, I found that all the organisms in group I., whether derived from polluted water or a faecal material, gave the reaction described by MacConkey. Unfortunately, other microbes, derived from virgin soils and unpolluted waters which failed to ferment lactose, also gave the same reaction. These organisms are not uncommon in unpolluted surface waters and virgin soils, so it appears that the bile-salt broth reaction cannot be regarded as a positive indication of the presence of *B. coli*.

The results of the tests with neutral red showed that it is a useful negative test ; but, as in the case of bile-salt broth, the colour change is not a certain indication of the presence of *B. coli*, being produced by many organisms found in pure waters and virgin soils.

It is now evident that with our present bacteriological knowledge we can only accept the bacteria in group I. as certain signs of faecal contamination, and to this group I would give the name *B. coli communis*. Durham suggested that group I. (*b*) should be called *B. coli communior*, but from the point of view of public health I regard any subdivision of this group as unnecessary. The bacillus

in group II. has received the name *B. lactis aërogenes*; judging the organism by its power of fermenting starch, I cannot say that it is frequently found in sewage-polluted waters. It has been customary to talk of the organisms in the groups III. to VI. as atypical forms of *B. coli communis*; but, as I have shown we have no evidence that group I. ever becomes converted into groups III., IV., V. or VI., it does not appear advisable to use a term which suggests the possibility of such a transformation. The general term colon bacteria might be usefully applied to these groups.

In waters derived from upland surfaces, especially when used for grazing purposes, it is quite possible that a certain amount of contamination may be caused by the dejecta of animals gaining access to the supply. It is important, therefore, to know whether the *B. coli communis*, as above defined, exists in the dejecta of animals, and if so, whether the bacilli from an animal source can be distinguished from those having a human origin.

Moore and Wright examined forty-three cultures of *B. coli communis*, isolated from domesticated animals; they found that twenty-three of the cultures belonged to group I. (a) and twenty-two to group I. (b). I examined the dejecta of flies, sheep and rabbits, and found typical *B. coli communis* to be present in all of them. The ordinary culture reactions corresponded to those of group I. (a) and (b) and could not be distinguished by the usual tests (see Table D).

Péré made some very interesting experiments on the rotatory power of the acids produced in glucose by *B. coli communis* derived from a human and an animal source. He found that all the *B. coli* produced a levo-rotatory lactic acid when the sugar media contained only salts of ammonia as a source of nitrogen. When peptone was substituted for the ammonia salts, the *B. coli* from a human source continued to produce the levo-lactic acid, while the *B. coli* from an animal source produced a dextro-rotatory acid. I have endeavoured to test Péré's statements, but so far without success. At the present time I fear it must be admitted that *B. coli* from an animal source cannot be distinguished from that having a human origin.

We are, therefore, compelled to allow that in upland surface waters the *B. coli communis* may be present without any pollution from a human source; but in my experience such waters only contain this organism very sparsely, so that a considerable quan-

T A B L E C.

Micro-organisms resembling Colon bacteria which are found in unpolluted waters and virgin soils.

	Deep well water in the chalk. (1.)	Artesian well. (2.)	Upland surface water. (3.)	Upland surface water. (4.)	Unpolluted soil. (N.)	Unpolluted soil. G (1.)	Unpolluted soil. G (2.)	Unpolluted soil. G (3.)
Surface colonies in gelatine plates	Typical, medium, not liquefied	The same as (1)	The same as (1)	The same as (1)	Thin and filmy, with irregular margin, medium not liquefied	The same as (a)	The same as (a)	The same as (N)
Gelatine stroke ...	Thin growth, margin irregular, surface not wrinkled	do.	do.	do.	Thin, transparent growth with irregular margin	do.	do.	do.
One per cent. glucose-peptone	Acid and gas ...	Acid and gas ...	Acid and gas ...	Acid and gas ...	Acid and gas ...	Acid and gas ...	Acid, no gas ...	Acid, no gas
One per cent. lactose-peptone	No gas, acid present	No gas, acid present	No gas, acid present	No gas, acid present	Acid slowly produced, no gas	Acid slowly produced, no gas	Acid in 24 hours, no gas	Acid slowly produced, no gas
One per cent. cane-sugar peptone	No gas, acid present	Unchanged ...	No gas, acid present	Unchanged ...	Unchanged ...	Acid and gas ...	do.	Unchanged
One per cent. starch-peptone	Unchanged ...	Unchanged ...	Unchanged ...	do. ...	do. ...	Unchanged ...	Unchanged ...	do.
Litmus - whey 24 hours	Acid, slight ...	Acid, slight ...	Acid, slight ...	Acid, slight ...	Acid, marked ...	Acid, slight ...	Acid, slight ...	Acid, slight
Do. 7 days	Acid, marked ...	Acid, marked ...	Acid, marked ...	Acid, marked ...	do. ...	Acid, marked ...	Acid, marked ...	Acid, marked
Potato ...	Yellowish - white growth	Yellowish-white growth	Yellow growth	Light yellow growth	Light yellow growth	Yellowish growth	Yellowish growth	Light yellow growth
Milk ...	Unchanged, after 14 days	Unchanged after 14 days	Unchanged after 14 days	Unchanged after 14 days	Coagulated (7 days)	Unchanged ...	Unchanged ...	Unchanged
Peptone and salt solution	Nitroso - indol reaction absent	Nitroso - indol reaction absent	Nitroso-indol reaction present	Nitroso-indol reaction absent	Nitroso - indol reaction	Nitroso-indol reaction	Nitroso - indol reaction	No reaction
Nitrate broth ...	Reduced to NO ₂	Reduced to NO ₂	Reduced to NO ₂	Reduced to NO ₂	Reduced to NO ₂	Reduced to NO ₂	Reduced to NO ₂	Reduced to NO ₂
Broth ...	Diffuse growth, no pellicle	Diffuse growth, no pellicle	Diffuse growth, no pellicle	Diffuse growth, no pellicle	Diffuse growth, no surface pellicle	The same as (N)	The same as (N)	The same as (N)
Proskauer and Campbell. No. 1.	Acid ...	Acid ...	Acid ...	Acid ...	Acid ...	Acid ...	Acid ...	Acid
Agar slope...	Alkaline ...	Alkaline ...	Alkaline ...	Acid (faintly) ...	Alkaline ...	Alkaline ...	Alkaline ...	Neutral
Neutral red ...	Greyish - white growth	Greyish - white growth	Greyish - white growth	Greyish - white growth	Greyish - white growth	Greyish - white growth	Greyish - white growth	Greyish - white growth
	—	—	—	—	Changed at the surface to yellow	Changed at the surface to yellow	Changed at the surface to yellow	Unchanged
Anaerobiosis	Growth ...	Growth ...	Growth ...	Growth ...	Growth ...	Growth ...	Growth ...	Growth
Morphology ...	Feebly motile, small bacillus	Feebly motile, small bacillus	Small, motile bacillus	Feebly motile, small bacillus	Small, motile bacillus	Small, motile bacillus	Small, motile bacillus	Small, feeblely motile bacillus
Gram stain ...	Decolorised ...	Decolorised ...	Decolorised ...	Decolorised ...	Decolorised ...	Decolorised ...	Decolorised ...	Decolorised

tity of water must be examined before it is detected. As a result of my work, I should say that a water which contained *B. coli communis* in one to ten cubic centimetres had certainly been contaminated with human excreta.

TABLE D.
Types of B. coli communis isolated from the dejecta of

	Flies.	Rabbits.	Sheep.
Gelatine plates	Typical, thin films, margin irregular, medium not liquefied	As in flies	As in flies
Gelatine slope	Thin broad growth with crenated margin	Ditto	Ditto
One per cent. glucose-peptone	Acid and gas	Acid and gas	Acid and gas
One per cent. lactose-peptone	Acid and gas	Acid and gas	Acid and gas
One per cent. cane-sugar peptone	Unchanged	Acid and gas	Acid and gas
One per cent. starch-peptone	Unchanged	Unchanged	Unchanged
Litmus-whey, 7 days at 37°C.	Markedly acid	Markedly acid	Markedly acid
Milk	Coagulated	Coagulated	Coagulated
Peptone and Salt Solution	Nitroso-indol reaction	Nitroso - indol reaction	Nitroso - indol reaction
Potato	Yellowish growth	Yellowish growth	Yellow growth
Neutral-red	Colour changed to yellow	Changed to yellow	Changed to yellow
Broth	Diffuse growth	Diffuse growth	Diffuse growth
Agar-slope	Greyish-white growth	Greyish - white growth	Greyish - white growth
Nitrate-broth	Reduced to NO ₂	Reduced to NO ₂	Reduced to NO ₂
Proskauer and Capaldi:			
No. 1.	Acid	Acid	Acid
No. 2.	Alkaline	Alkaline	Alkaline
Anaerobiosis	Growth	Growth	Growth
Morphology	Small motile bacillus	Small motile bacillus	Small, feebly motile bacillus
Gram stain	Decolorised	Decolorised	Decolorised

Savage, however, states that "in upland surface waters the presence of *B. coli* in 40, 10 and even 2 or 1 cc. means contamination, but not necessarily a contamination which it is essential to prevent. It may be from contamination with the excreta of animals grazing on the gathering grounds and is by no means necessarily from sewage or other material containing specific organisms of infection." Savage's opinion is based on careful examination of upland surface waters in Glamorganshire; but, unfortunately, in his definition of *B. coli* he makes no allusion to the fermentation

of lactose as a necessary test for the isolation of this organism, so we cannot accept the above statement as fully proven. It is obvious that in upland surface waters we must always clearly indicate the amount of water in which *B. coli* has been found as a basis for an opinion that the supply has been contaminated, and experience shows that *B. coli* from an animal source alone is rarely found in 1 to 2 cc. of such waters.

In properly protected deep wells and springs the *B. coli* is not found unless a considerable quantity of the water is submitted to examination. During nearly three years I examined 200 cc. of water from these sources without finding a trace of the typical *B. coli*. Occasionally when a whole litre was examined by the "filter-brushing" method, the *B. coli* was detected, but this result I considered had no signification, being probably caused by a little surface dust.

CONCLUSIONS.

(1) The *B. coli communis* (group I.) is the only organism of the coli type on which implicit reliance can be placed as an indication of sewage contamination.

(2) The *B. coli communis* (group I.) should not be present in 200 cc. of water derived from properly protected deep wells and springs.

(3) If *B. coli communis* (group I.) be not found in 10 cc. of upland surface waters, it is practically certain that the supply has not been recently contaminated with human faecal material.

REFERENCES.

- JORDAN, *Journal of Hygiene*, vol. iii., No. 1, p. 10.
MOORE and WRIGHT, "American Medicine," 1902, vol. iii., p. 504.
SAVAGE, *Journal of Hygiene*, vol. ii., No. 3, July 1, 1902.
PECKHAM, *Journal of Experimental Medicine*, 1897, p. 549.
PÈRE, *Annales de l'Institut Pasteur*, 1898, p. 66.
THEOBALD SMITH, *Journal of Experimental Medicine*, 1897.
HOUSTON, "Supplement Local Government Board Report, 1900-1."

FURTHER CASES OF PERFORATING GUNSHOT WOUND OF THE SKULL.

LIEUT.-COL. S. F. LOUGHEED, C.M.G.
Royal Army Medical Corps.

THE following notes of cases and comments thereon constitute a continuation of the two cases reported by me in the August number of this Journal.

CASE 3.—Private P. C., Nesbitt's Horse, wounded at Philippopolis on October 22, 1900, at a range of about 100 yards, with a Mauser bullet. Remained semi-conscious and did not speak for three days. Admitted to No. 12 General Hospital, at Springfontein, five days later, when he was found to have motor paralysis

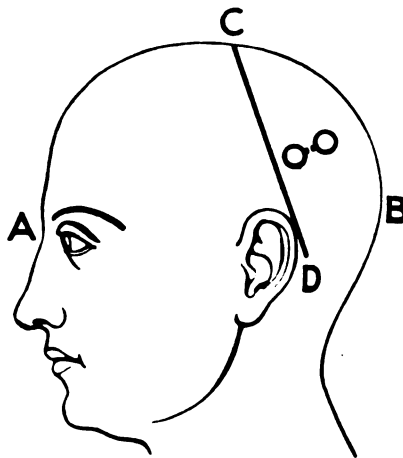


FIG. 1.

of the right arm and leg, with paresis of the right side of face and exaggerated right knee-jerk. These symptoms were accompanied by Jacksonian seizures, commencing in the right side of the face and involving all the right side of the body. He had ataxic aphasia, understanding all questions, but giving wrong answers. The entrance wound was 1 inch posterior to a vertical line CD (see fig. 1), drawn from the apex of the left mastoid to a point $\frac{1}{2}$ an inch behind the centre of AB, viz., at C, and

4 inches above the mastoid apex. The exit wound was 3 inches above the external occipital protuberance, and 1 inch to left of the median line. No depression of bone could be felt between these wounds, which were septic. On October 31 the scalp was divided between the wounds, and another incision carried across at right angles. No fracture was found to exist. A trephine disc was removed from under the entrance wound, and the hole enlarged with Hoffmann's gouge. The dura was blue from presence of a clot beneath; after incision about two ounces of clot were removed. The brain then pulsated.

The parts were cleaned and the dura sutured; the wound was closed except at one point, where a small tube was inserted. The patient slept for five hours after the operation, but had two fits the next day. Owing to his becoming violent in the evening chloroform was administered, after which he slept for eight hours and had no fits subsequently. The tube was removed in forty-eight hours and the stitches on the eighth day, the wound being then closed. All paralysis disappeared and speech returned, the man making an excellent recovery. He was sent to the coast on December 12, apparently in good health.

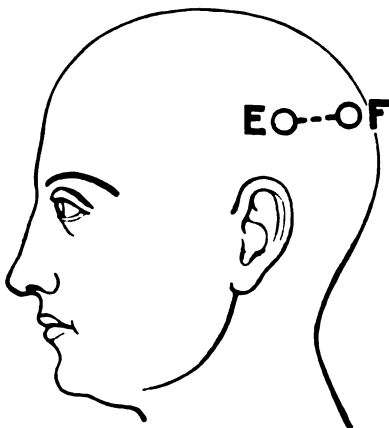


FIG. 2.

CASE 4.—Private V. B., of the 9th Lancers, was wounded near Dewetsdorp, on April 16, 1901, at an unknown range, by a bullet, probably a Mauser. He recovered consciousness in ten minutes, but found he could not use his right arm. When admitted to

No. 12 General Hospital, Springfontein, on April 18, he was quite sensible, but had complete motor and sensory paralysis of the right arm; but the face and legs were normal and the tongue was protruded straight. He complained of slight headache. The wound was slightly septic and ragged, 2 inches in length, and ran horizontally over the left Rolandic area, slightly above the parietal eminence, from E to F (fig. 2), the point E being $2\frac{1}{2}$ inches vertically above the apex of the mastoid. The scalp only was divided, the bone not being bare. The diagnosis lay between a depressed inner table and a sub-dural clot.

On April 22, 1901, a crucial incision was made over the wound, and a disc of bone removed. A very small clot lay between the bone and the dura mater. The opening was enlarged and the dura divided; about two drachms of blood clot were found beneath and removed. No fracture or depression was visible. The parts were cleaned and the dura mater sutured. A small drain was put in and brought out through the scalp incision, which was then united. The progress of the case was good. On April 23 the arm could be moved voluntarily, and sensation had returned in it; the temperature was normal, and he slept well. The tube was removed in forty-eight hours and the stitches on the seventh day. The wound healed soundly, and progress was uninterrupted. The arm had nearly recovered on May 3, when he was invalided to England.

CASE 5.—Private J. R., 1st Argyll and Sutherland Highlanders, was wounded at Magersfontein on December 11, 1899. The case was said to have been operated upon in a field hospital; a scalp flap had been made, but no trephine opening was visible in the vault. He was admitted to No. 2 General Hospital, Wynberg, a few days later. The bullet had struck the skull $\frac{3}{4}$ of an inch above and to the right of the occipital protuberance and glanced off, causing three small fissures. A disc of bone was removed, and the dura found lacerated. Twelve fragments of bone, mostly of the inner table, were removed from a depth of $1\frac{1}{2}$ inches. The dura mater could not be brought together, a drain was inserted, and one end brought out at the lowest angle of the wound. The tube was removed in forty-eight hours. The wound was completely healed by the twelfth day. The patient made an excellent recovery, and was invalided home on January 31, 1900. He had no paralysis or aphasia at any time.

CASE 6.—Private F. O., 1st L.N. Lancaster Regiment, was wounded at Graspan on November 25, 1899, at a long range (over 1,000 yards). He was found on December 6, 1899, at No. 2 General Hospital, Wynberg, to have a glancing bullet wound 2 inches above the right eyebrow, $1\frac{1}{4}$ inches in length. No bare bone or fracture could be detected; but the wound was septic. On December 12 he had headache, and his temperature was $100\cdot2^{\circ}$ F. On December 15 he had rigors and vomiting, and puffiness of the right eyelid was present. His temperature was $103\cdot4^{\circ}$ F.; but paralysis at any time was not observed.

On December 17 he was operated upon, the original wound being enlarged at both ends, and a third incision made in a T shape, including the periosteum. A small stellate fracture was found, and a disc of bone removed, which included the fracture. About one and a half drachms of pus were found between the dura mater and the vault, and were removed; the dura was inflamed, but not torn. The parts were cleaned and a drainage tube inserted, but the disc was not replaced; the scalp wound was closed, except at one end for the tube. His progress was good till December 25, when he became drowsy and his temperature went up. The wound was then opened again under an anæsthetic, and a probe passed between the vault and dura, all round the opening; no pus or blood was found. He died suddenly on the morning of December 28, 1899.

At the autopsy, an abscess cavity containing one and a half ounces of pus was found in the right frontal lobe, quite an inch beneath the anterior surface; it had a definite wall, and communicated through a cerebral laceration and a small track in the dura with the space between the dura and the cranial vault, just above the trephine opening.

CASE 7.—Private L. G., 2nd Royal Highlanders, was wounded at Magersfontein on December 11, 1899, at a long range. He was admitted to No. 2 General Hospital, Wynberg, a few days later. The bullet apparently entered 1 inch from the middle line, over the coronal suture on the left side, and made its exit 1 inch from the middle line, over the lambdoid suture on the same side. The distance between the wounds was 4 inches and broken bone could be felt under the track of the bullet. On December 15, 1899, the patient was drowsy; both thick and slow in speech, and the pulse 60; his temperature was normal,

and he had complete loss of power in the right leg, arm and lower part of face, with loss of sensation over the same area. The left side was normal.

On December 16 a large semi-circular flap was reflected downwards, exposing a deep "gutter" fracture 4 inches long, which involved both tables, there was also much laceration of the dura and brain. One loose piece of bone, 1 inch square, was removed from near the entrance wound; also several smaller ones from the gutter. When all clots were removed the brain substance exuded. All sharp points of the edges of the gutter were chipped off with Hoffmann's gouge, and many small pieces of bone, found deeply embedded, were removed. The dura could not be brought together by sutures. There was little bleeding. A medium size drain was laid in the gutter and its end brought out at one extremity of the scalp incision, which was closed, except at this point; interrupted gut sutures were used. The tube was removed on December 18, and the wound looked well; sensation had then partly returned in both arm and leg. On December 24 he could move the arm and leg well, and sensation was nearly complete in them. On the same date the stitches were removed, and the wound found nearly healed. No suppuration had occurred. On January 1, 1900, a few twitches were noticed in the right arm, and speech had much improved. On January 30 the twitchings had gone, and he could walk about a little. He was greatly improved, but the grasp in the right hand was weak, and he dragged the right leg. On February 20 he was sent to Netley, the leg and face having almost recovered, but the arm was still weak. His speech was quite normal.

CASE 8.—Private W. P., 2nd Seaforth's, was wounded at Magersfontein on December 11, 1899, at a long range, and admitted to No. 2 General Hospital at Wynberg in a few days. On December 17 he was found to have left facial paralysis, complete paralysis of tongue, paresis and partial anæsthesia of the right arm. The legs were normal. He had a "gutter" fracture running horizontally across the centre of the left parietal bone, $1\frac{1}{2}$ inches long, and the scalp was divided over the injured bone. There was slight squint of the left eye inwards. His speech was very considerably affected, principally in the form of motor aphasia. Pulse 40 and temperature normal.

He was operated upon on December 18, and a disc of bone

removed from below the centre of the gutter. Many spiculæ were removed, both large and loose, also some clot. The dura, which was not torn, was of a dark blue colour and did not pulsate. The dura was then divided, and a quantity of clot found and removed from the surface of the brain; the latter then pulsated slowly. The dura was not sutured and the disc was not replaced. The wound was then closed, except at one corner for a drainage tube. The symptoms persisted for four days and then rapidly disappeared. The tube was removed in forty-eight hours and all stitches on the seventh day. The wound healed soundly, and the patient regained full power of the tongue and speech, and the facial paralysis disappeared. He was invalided to England on January 31, 1900, with only some weakness of the right arm remaining.

CASE 9.—Private H. D., 2nd Royal Highlanders, was wounded at Springfontein on December 11, 1899, at a short range of about 250 yards. His condition at No. 2 General Hospital, Wynberg, on December 23, was as follows: Drowsy and aphasic, with paresis of the right arm; the right leg was normal; the right side, face and tongue were paralysed. He was then having Jacksonian epilepsy. The pulse was normal, and his temperature 99·9° F. A gutter fracture 4 inches long ran through the centre of the left Rolandic area. Operation was performed on December 23. The wound was then suppurating and a pulsating "hernia cerebri" present. The hernia cerebri and many loose pieces of bone were removed; tubes were placed in the ends of the wounds, and the scalp partly stitched up. On the next day the paralysis of the tongue had gone, the aphasia was better, and he had no fits. The temperature was normal. He improved for fourteen days, when the temperature went up, and the discharge became profuse.

A second operation was performed on January 18, 1900, when the wound was opened up and the granulations scraped; pus was seen oozing through a small rent in the dura. A director was passed into the brain for 2½ inches, and an abscess tapped containing one ounce of pus. The cavity was emptied and a tube inserted.

A third operation was performed on February 22, the track into the cavity was enlarged and a flexible silver tube inserted. Progress then was good. The wound healed soundly, and he was invalided on March 30, having recovered his speech, but his right arm was still very weak.

CASE 10.—Corporal W. O., 1st Gordon Highlanders, was wounded at Magersfontein on December 11, 1899, and admitted to No. 2 General Hospital in a few days. The bullet had entered the upper left frontal region close to the hairy scalp, and came out through the left orbit, disorganising the globe of the left eye. He had no paralysis, but his speech was considerably affected.

Operation on December 16.—Two discs of bone were removed from the vicinity of the entrance wound; much depression of the inner table existed, which was raised and removed. The dura was not much lacerated. The wound was closed without any drain. The stitches were removed on the fifth day, when the wound had almost healed. His speech gradually returned and a good recovery ensued. The left lobe was removed at another operation.

CASE 11.—Corporal C., 1st D.C.L.I., was wounded at Paardeburg on February 18, 1900, at a range of 450 yards, with a Mauser bullet. He was admitted to No. 2 General Hospital in a few days, in the following condition: A small entrance wound existed $1\frac{1}{2}$ inches behind, and a little below, the external angular process of the frontal bone on the right side. The exit was $\frac{1}{4}$ -inch above and behind the left external angular process. The patient stated he had had much bleeding, and that he saw with his right eye for half an hour, and with the left for an hour after the injury; since then he has been totally blind. He had no paralysis, but had much headache. His progress was good. The wounds healed in a week, leaving proptosis, most marked on the right side, with conjunctivitis of both eyes and œdema of the right lids, both pupils being dilated and not responding to light, but the ocular movements were fair. The headache yielded to pot. iod., but his vision did not improve. He was invalided at a later date.

CASE 12.—Private P. P., Imperial Yeomanry, was wounded near Edenburg on March 10, 1901, at a range under 100 yards, with a Mauser bullet. He was mounted when hit, and after falling was dragged along the ground for some distance. He was admitted to No. 12 General Hospital, Springfontein, on March 11, in the following condition: Scratches about the face; headache; pupils equal and re-acting; sensible, but no paralysis was observed. Entrance wound over back of neck, $\frac{3}{4}$ -inch to the right of the median line, small, circular and clean. The exit wound was almost similar, $\frac{1}{2}$ -inch below the right malar prominence. He had full movement of

the lower jaw, and no fracture of it could be detected. The buccal cavity was not perforated by the bullet. There was slight ecchymosis behind the right ear and under the right conjunctiva. The wounds were cleaned and sealed with collodion. Progress was favourable till March 17, when his temperature went up to 101° F., with headache, referred principally to the vertex. Progress was bad subsequently; ecchymosis developed under both conjunctivæ; pains were complained of in calves of both legs, and twitchings were noted in the right shoulder and leg. He was drowsy and refused food. The collodion was removed from the wounds, but both were found quite healthy. On March 19 he had retention of urine, was groaning and insensible; pupils medium and slow to act, and spasm of the muscles of left side of neck was present. The temperature rose to 107° F. at 4 p.m., when the right pupil was widely dilated and contracted. He died at 5.30 p.m. the same day.

At the autopsy pus found at the base of the brain and around the pons and medulla, spreading up the left side over the Rolandic area (patient lay on his left side during the illness). Both Rolandic areas were covered with semi-gelatinous lymph; there was a fracture of the great wing of the sphenoid and adjoining part of the petrous bone into the foramen lacerum medium; the piece being loose but attached. On laying open the track of the bullet, the neck of the condyle of the lower jaw was found fractured, and had evidently been forced upwards, causing the fracture of the base. No pus was found in the track of the bullet, which was aseptic, as also were both entrance and exit wounds. There was no evidence of suppuration in the external auditory meatus or tympanum. The membrane was intact, and no fracture of the posterior wall of the tympanum could be seen.

CASE 13.—Private L. B., South African Light Horse, was admitted to No. 12 General Hospital on August 21, 1901, suffering from the effects of an old gunshot injury of the skull received at Colenso on December 15, 1899, at a range of 500 yards, with a Mauser bullet. He stated that after being wounded he had paralysis of the right leg, arm and side of face, was able to speak, but his bladder and rectum were not affected. He was sent to Netley, but remembers little about himself beyond that he was trephined on left side of his head. On recovery and discharge from Netley he returned to South Africa.

Present condition.—Has a semi-circular scar in the left tem-

poral region, and small sinus in its centre—evidently the old wound of entrance—where dead bone can be felt with a probe; also a scar, evidently the exit one, on a perpendicular to Reid's base line, commencing $\frac{3}{4}$ -inch in front of external auditory meatus and continued up for $1\frac{1}{4}$ inches. The entrance scar was on the same line 4 inches above Reid's base line as shown in fig. 3.

The sinus has been discharging at times for a year. He has full power in the right arm and leg, but the right side of the face is slightly drawn down. The lower jaw is displaced $\frac{1}{2}$ -inch to the right, the teeth not approximating. Uvula and soft palate are normal. The tongue when protruded describes a semicircle to the right. He cannot whistle properly. His speech is clear,

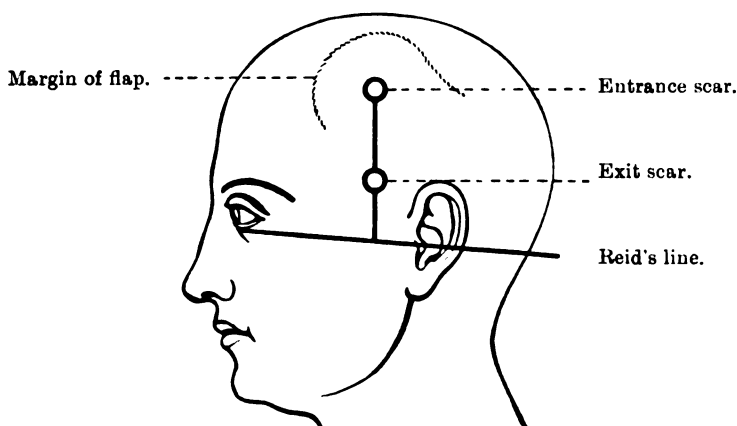


FIG. 3.

distinct, and slow. He is quite unable to talk fast, and when excited cannot form his words. When he makes a mistake in speech, he is conscious of it and corrects himself slowly. Cannot remember names of places except those he knew well. If told to do a thing or sent on a message, he forgets all about it before reaching his destination, but may remember about it hours or days after. Is unable to name familiar objects when shown them. If a comrade at table asked him to pass the salt, he might pass the mustard or sugar instead.

He states that he could write well before receiving the injury. Now he can spell correctly, but not write intelligibly. He mixes

up his letters and omits many in a word. When he has written a word incorrectly he is quite conscious of it, endeavours to correct it, sometimes wrongly. Can write familiar words correctly, such as his own name. If he practises writing a word he writes it correctly after a time. Makes mistakes in calculations and in counting money, &c., and does the latter slowly. He can read print, slowly but correctly. The knee-jerks and plantar reflexes are normal; ankle clonus absent.

On September 3, 1901, a vertical incision was made over the trephine opening, under the entrance wound, and two pieces of dead bone removed, as shown in their natural size in fig. 4.

The wound healed by first intention. He was invalided on September 22, as unfit for further service; but with much marked improvement in cerebration, talk, memory and writing.



FIG. 4.

CASE 14.—Private F., 1st Royal Irish Fusiliers, fell out of a train near Springfontein on October 30, 1901, and was admitted to No. 12 General Hospital the same day. He was found to have a depressed "pond" fracture in the right parietal region, near the middle line. No paralysis; was quite sensible (patient had also a compound comminuted fracture of the left leg, necessitating amputation, and a simple fracture of the right femur in the lower third). An operation being performed at once, the depression was found to confine itself to the outer table. A trephine disc was removed from the outer table and all the depressed pieces removed. The inner table was quite intact. Owing to the extensive laceration of the scalp, the wound healed by granulation. The bone was covered by February 3, 1902, and the wound soundly healed by March 28.

CASE 15.—Private S. was wounded at Modder River on November 28, 1899, at an unknown range. He was admitted to No. 2 General Hospital on December 2, 1899. His condition was very restless, and he refused examination. Apparently there was no paralysis. Temperature 103.4° F. Anæsthetised and

examined on December 2. Entrance wound $\frac{1}{2}$ -inch above, and to the left of the occipital protuberance, showing gutter fracture over the lateral sinus. Emphysematous crackling was present over the right side and back of neck. No wound could be seen or felt in the pharynx. Patient became very collapsed; the anæsthetic was discontinued and the wound dressed only. There was no exit wound. The progress of the case was bad; restlessness and acute delirium continued. He coughed up much fœtid pus with some blood. The right lung became consolidated, and the temperature ranged between 102° and 104° F. He died on December 20, 1899.

At the autopsy a "Mauser bullet" was found embedded in the right quadratus lumborum, near the crest of the ilium. A gutter fracture involved $1\frac{1}{2}$ inches of the occipital bone under the entrance wound, while much comminution was found. A large fragment of the inner table had been driven into the lower part of the occipital lobe on the left side, which was pulped. A spicule of bone projected into, but did not penetrate, the lateral sinus. The cerebellum was much bruised and somewhat lacerated. The bullet passed through the muscles of the back of the neck and entered the chest. The right lung was badly lacerated throughout in the vertical direction, and contained a piece of bone (rib?). The second and third dorsal vertebræ were deeply grooved on the right side of their bodies. The eighth and ninth ribs were grooved and the tenth and eleventh fractured close to their angles.

REMARKS ON THE PRECEDING CASES.

Of the foregoing cases, thirteen were produced by small bore bullets, one by a 0.450 leaden revolver bullet (Case No. 1 in the August issue of this Journal), and one was the result of a fall from a train. These cases were treated in No. 2 and No. 12 General Hospitals, South African Field Force, the surgical divisions of which, at different times, were in my charge. Most of the cases were under my personal care during the whole of their illness, the remainder under various officers doing duty with me; these latter cases I was in constant touch with, assisting those in immediate charge at operations, consultations, and often at dressings also. It will be seen that the series embraces nearly every degree of severity of gunshot injury of the skull, from an apparent scalp

wound with no bone damage, but with subdural hæmorrhage, to complete perforation of the vault and base separately. Gutter fractures were the most common.

Case 3 is very interesting, a scalp wound apparently produced at close range, followed by insensibility, which disappeared, to come on again, accompanied by Jacksonian seizures, up to thirty-six in one day. At the operation one could find no trace of fracture, in spite of close examination; a subdural clot alone was found. The patient was young, 19 years, and the vault, evidently elastic, yielded to a force of the bullet sufficient to cause laceration of the vessels beneath the dura, but not enough to cause fracture at the point of impact. The amount of subdural clot was very considerable, viz., nearly two ounces. His Jacksonian fits diminished very much in number after the operation, but did not disappear till sleep had been procured by chloroform, on account of the patient's violence. After an eight hours' continuous sleep he awoke quite conscious and refreshed, and had no more fits. The drainage tube, which had been inserted on account of the size of the clot, may have had something to do with the continuance of the fits, but they entirely left him before the tube was removed on the fourth day after operation.

Case 4 shows temporary unconsciousness on receipt of injury, followed by recovery to find that he had paralysis of the opposite arm. The hæmorrhage on to the arm centre in the Rolandic area must have occurred almost at once, certainly within ten minutes, of the receipt of injury. The amount of clot was small, about two drachms. The paralysis and anæsthesia had disappeared on the morning following operation. A drainage-tube was also put in, but removed forty-eight hours later. I am inclined to believe this to be a sound procedure.

Case 6 is exceedingly interesting, being apparently a glancing wound only of the scalp, and not laying bare the vault. The wound had become septic during the thirteen days which had elapsed prior to his admission to hospital, and the parts had to be cleaned and fomented for some days before operation. When the periosteum was reflected, a small stellate fracture was discovered, together with signs of extra-dural suppuration. The progress was promising for some days, but then the temperature went up, and the patient became drowsy. At the second operation a trochar should have been used to seek deeply for pus, after

division of the dura, but at the time septic meningitis was considered the more probable complication, then deep cerebral abscess, because the dura mater was intact.

The different "gutter fractures" varied considerably according to locality, thickness of bone at point of impact, and depth of vault involved, viz., from a superficial groove of the outer table to a complete destruction of both tables and diploe, for varying lengths. In many of these there was much laceration of the dura and pulping of the brain substance, mixed with clot and bone *débris*. As to the amount of brain laceration found in these gutter fractures, our experience goes to show that it also varies considerably, and will depend principally upon the length of the gutter. This latter again depends upon the rotundity of the vault at the part hit. The laceration would be more when the track of the bullet formed a small arc of a large circle than when it formed a large arc of a small circle; consequently it will be greater in antero-posterior wounds than in transverse ones.

It is remarkable to note how many of these and other head injuries are found at or near the Rolandic area on the left side. This can be understood when one remembers that the parietal eminence is a very prominent part of the cranial vault, and that when a soldier is advancing, during an action, the left side of the head is held in advance of the right.

Involvement of the frontal sinuses and the danger of septic infection from admission of air, is a very serious complication, as shown in the first case.* A case bearing on this point came under notice at Pietersburg, Transvaal, where a native received a blow from a stick, and the inner table was fractured and depressed. Air bubbled up through the infundibulum during expiration. Although all depressions were removed by operation, death ensued from septic meningitis. The loss of much cerebro-spinal fluid is also a bad sign, emaciation of the patient and lowering of vitality ensuing so rapidly, in addition to the constant danger of septic infection through the moistened dressings. I am unaware of any means of dealing successfully with these two complications. In dealing with gutter fractures, as well as others, very thorough search should be made for depression of the inner table and for spiculæ driven into the brain. They should all be removed. If

* See this Journal, No. 2, p. 104.

any are left behind they are likely to give rise to subsequent trouble (*vide* Case 13).

Among these personal cases there were none of penetration of the vault with retention of the bullet, although a few were seen in other hospitals. Perforations of the vault were common. A typical case, and one full of interest, is Case 2. Here the range was 1,500 yards, showing the amount of force still retained by the bullet. The patient remembered little of what happened for forty-eight hours. The entrance opening in the skull had no fissures radiating from it on the external surface, although a large piece of the inner table was fractured off and depressed. The opening in the dura was small. Many pieces of both tables were driven nearly two inches into the brain substance, these varied in size, being mostly small and easy to escape detection at the operation. That the superior longitudinal sinus escaped injury was fortunate. One could feel—at time of the operation—with the finger the opening made by the bullet in the falx cerebri, it was small but distinct. The conditions at the exit wound were quite different. It was larger and more irregular, and with a tendency to eversion of its edges, but apparently no bone had been driven out through it. The same clean-cut perforation of bone did not exist as at the entrance, fracturing of the margins existed with loosening and displacements of fragments, some of these latter over-riding the adjacent but sound vault. There was no fine communication, but there was more laceration of the dura than at the entrance. Apparently a bullet can pass through both hemispheres in an oblique direction without doing much serious damage. I am inclined to think that most of the bone *débris* found in the track of a perforating wound comes from the inner table, so that the vault would be bevelled at the expense of the inner table around the entrance perforation. Bone *débris* cannot be expected to be found in or around an exit perforation beneath the level of the vault, unless the entrance and exit perforation are very near one another, in which case the injury to the vault would probably take the form of a “gutter,” unless the convexity was very considerable at the spot hit. Bone *débris* I have seen once in an entrance wound of the scalp, overlying a perforation, and this fact has been satisfactorily accounted for by Mr. Makins in his book.

With regard to “hernia cerebri,” I believe they are in great

measure due to sepsis and the retention of bone *débris*, clot, and disintegrated or pulped brain substance, beneath the vault. The fungating mass grows outwards through the rent in the dura mater and vault perforation, in the line of least resistance, from increased intracranial pressure. The increase in size is, I think, due to combined irritation from bone spicules and sepsis. Herniæ are seldom met with in aseptic conditions, but flourish under the reverse. I think they can be cautiously removed from any wound without much risk, and further exploration then carried out. If sources of irritation are removed, they are unlikely to recur.

Exploration of every gunshot wound of the head with bone injury is necessary, and in many where no such injury is apparent, but suspected. Trephining is not necessary in gutter fractures where a large opening exists already in the vault. Hoffmann's gouge will often suffice to raise fragments. I have never replaced a trephine disc in any of these cases and cannot regret the course pursued. Where a trephine disc has been removed, further enlargement of the opening is nearly always necessary, thus leaving an irregular opening which the disc will not completely fill. The periosteum and dura are often removed or damaged to some extent by injury or operation, and necrosis of the disc is liable to ensue, if it be replaced under these conditions. The re-formation of bone in trephine openings is, in my opinion, very rare—this may to some extent be accounted for by the damage to the dura mater and periosteum from the original injury, or to a want of proper re-adjustment of the periosteum over the trephine opening at the end of the operation. The usual result found is a depressed scar which pulsates. A metal shield may subsequently be required to protect the parts.

Case 1 is of singular interest. I have before me very extensive notes of this man's case, which in this article must necessarily be curtailed. The range at which he received his injury was very short, and would no doubt account for the so-called explosive effects observed in the bony vault at the exit wound. The calibre of the bullet was also large (0.450) and the bullet was entirely leaden. I do not believe a similar, or such an extensive bony injury, would have resulted from a 0.303 or Mauser bullet, at the same close range with an equal amount of driving power behind it. The patient was wounded on August 16, 1901, and had to be carried in a waggon with his column till September 9, when he

was transferred to a stationary field hospital. He constantly lost quantities of cerebro-spinal fluid during this time, and the difficulties in dressing him and keeping the wound clean must have been great. After operation he seemed to improve for a time, although the fluid drained into the dressings in enormous quantity. We were quite unable to check it. He lived for nine days after the operation ; during this period he became extremely emaciated. At the autopsy one was quite surprised to find that pus flowed from the interior of the skull when the body was turned face downwards (patient always lay on his back during the illness). In reality proper drainage had not been established. The pus was not of a highly septic nature, had no offensive smell, and had evidently formed from the disintegrated and necrosed parts of the anterior extremity of the frontal lobes, which must have been pulped originally by the bullet. There was no trace of septic meningitis present, although the frontal sinuses were freely opened into by the original injury.

Case 12 indicates the danger of admission of air and septic germs into the cranial cavity. The autopsy showed that the neck of the lower jaw had been fractured by the bullet and the condyle had been driven upwards into the glenoid fossa, thus causing an indirect fracture of the base. The wounds and track never suppurated ; they healed without trouble, consequently sepsis was not admitted by this channel. I am of opinion (although one failed to discover it at the *post mortem*) that the tympanic cavity was opened by the fracture and that air entered through the Eustachian tube, and thus caused septic meningitis.

Case 15 is the only one of gutter fracture of the base which I had. The range must have been long, as the bullet was retained. Owing to the patient's condition when put upon the table, operative measures could not have been carried out. I doubt whether much could have been done for him surgically. The fact that he lived for twenty-four days with such a grave injury to the cerebellum is remarkable. During this time he was never conscious, but swallowed liquids when they were placed in his pharynx.

Case 13 is of interest in showing the late after-effects of a wound involving Broca's convolution. From the sketch of the two pieces of bone which were removed from the sinus in site of the original entrance scar and trephine opening, it will be seen that neither of them showed any evidence, from size or shape, of their having

been pieces removed by the trephine and subsequently replaced. I should say that they were pieces originally fractured and driven into the brain substance by the bullet, and that they escaped detection and removal at the original operation

Case 2 is of further interest, in that it has been traced subsequently, almost up to the present date. As to his subsequent fits, they have neither been numerous nor severe, and may have been due—as the patient himself admits—to dietetic or other errors in living. Moreover, he has some hemianopsia from the occipital lesion, the extent of which we do not know. It is to be regretted that I originally overlooked it.

If one had a similar case again, I should adopt the American method of placing a thin layer of gutta percha between the brain and the scalp, so as to avoid the formation of adhesions between these structures. These adhesions probably induce the fits, by dragging and irritation. I have quite recently seen a case in the West London Hospital where gutta percha was inserted, and the results are likely to be promising.

Cerebral abscesses are very undesirable complications to gunshot wounds and often very difficult to recognise. When such a condition is suspected, the wound should be opened up, a trephine disc removed, if not already done, and the dura mater freely opened. Extensive and deep exploration with a trochar should then be made in many directions, and if pus is found, it should be evacuated and the cavity drained, but not irrigated. If the cavity be deeply situated and not immediately beneath the trephine opening, a flexible silver wire drainage-tube with flanges should be inserted. As the cavity fills up subsequently, more layers of gauze may be placed between the scalp and flanges of this tube, so as to shorten its depth of insertion, until it is no longer required. When these abscesses are properly drained they should heal up without trouble. If they are left alone death is almost certain to ensue.

On the whole, one may say that head injuries are very satisfactory to deal with, and the astonishing results which follow successful operations are distinctly encouraging alike to the patient and the surgeon.

Editorial.

RECENT SUGGESTIONS FOR THE DETECTION OF ENTERIC AND COLON BACILLI.

FOR those engaged in either the routine examination of waters or the clinical investigation of obscure fever cases, the isolation of the enteric bacillus and its allied species has always been a matter of great difficulty. As several methods, directed to attain this object, have been proposed lately, a general review of the subject may be of value to those who have not access to the original papers.

Schueder (*Zeitsch. f. Hyg.*, Bd. xlii., Hft. 2, p. 317), developing an idea originally put forward by Vallet, to concentrate in a small volume the bacteria of a given quantity of water by artificially precipitating them, proposes the following technique. Add to two litres of water under analysis, contained in a suitable vessel, 20 cc. of a 7.75 per cent. solution of hyposulphite of soda and 20 cc. of a 10 per cent. solution of lead nitrate. Centrifugalise, or permit the precipitate to separate out by allowing to stand for twenty hours. Decant off the clear liquor and redissolve the deposit in 14 cc. of a saturated solution of hyposulphite. From this inoculate, by streaking, the surface of a series of lactose agar plates; incubate at 37° C. for twenty hours, and finally examine the resulting colonies.

Windelbandt, not long ago, suggested another procedure, based upon the fact that the enteric bacillus quickly forms clumps and falls to the bottom of a broth culture on the addition of an anti-typhoid serum. A series of broth tubes are inoculated each with 1 cc. of the suspected water. The broth cultures are incubated at 37° C. for forty-eight hours. A diffuse growth results, usually covered by a pellicle: this latter is removed, and to the cloudy broth a few drops of active anti-typhoid serum are added. The enteric bacilli, if present, are precipitated and form a deposit at the bottom of the tube; this deposit is readily separated by centrifugalisation. On decanting off the clear fluid, the deposit of agglutinated bacteria are now emulsified in water or salt solution, and from this emulsion a series of gelatine or other plates set. Windelbandt originally suggested 20 per cent. gelatine;

Schepilewski has since proposed (*Centralbl. f. Bakter.*, No. 5, 1903) a modification by adding litmus to the gelatine, and claims to have recovered the enteric bacillus from a volume of one hundred litres of water when fouled by as little as one loopful of a fresh typhoid agar culture.

We have no experience of Windelbandt's method, but deem it open to the objection of failing to deal satisfactorily with any large volume of water, and necessitating the employment of a very active specific serum which, not always to be readily obtained, may precipitate other bacteria than that of enteric fever. If Schepilewski's results can be confirmed, it is obviously a highly sensitive procedure. As regards the Vallet-Schueder method, by employing neutral litmus lactose agar for final plating, in our hands the enteric bacillus was recovered readily from five litres of tap-water after contaminating the same with one loopful of a fresh agar culture. The hyposulphite of soda and the nitrate of lead have apparently no germicidal action on the bacteria which they entangle and carry down in precipitation.

MacConkey (*Thompson-Yates Laboratories' Report*, vol. iii., part i., p. 40, and part ii., p. 151) has suggested a medium of considerable value for the detection and isolation of the colon bacillus, and which forms also a rough test for the faecal contamination of water. It may be used, too, for the isolation of the enteric bacillus. The medium is a bile-salt lactose agar, which is prepared as follows: To a litre of tap-water in a flask are added 2 per cent. peptone, 0.5 per cent. of sodium tauro-cholate, and 1.5 per cent. of agar. The flask is autoclaved at 105° to 110° C. for one and a half hours. The mixture is then cooled, mixed with white of egg, and filtered; then 1 per cent. of lactose is added. The medium is distributed into test-tubes, say 10 cc. in each, which are sterilised by steaming for twenty minutes on three successive days. After inoculation, plates are made and incubated at 42° C. for forty-eight hours. There is a marked difference between the colonies of the enteric group and those of the colon group. The enteric surface colonies are small, round, raised and semi-transparent, the deep ones being lens-shaped, white and opaque, the medium itself remaining clear. The colon surface colonies are roundish or irregular, with flattened tops, opaque, white, with a yellow or orange spot in the centre; some have a haze round them. The deep colonies all have a haze round them, are lens-

shaped and orange-white in colour. The haze is due to a precipitation of the tauro-cholate by acid produced by fermentation of the lactose. A modification of this medium has been since suggested (*ibid.*, vol. iv., part i., p. 151) in the form of a bile-salt broth. It is composed as follows: Sodium tauro-cholate, 0·5 gramme; glucose, 0·5 gramme; peptone, 2 grammes; water, 100 cubic centimetres. The constituents are dissolved by heat, and the mixture filtered. After filtration, sufficient neutral litmus is added to give a distinct colour, and the medium then distributed into Durham's fermentation tubes. These are ordinary test-tubes containing a piece of light glass tubing, about an inch in length, closed at the upper end. This acts as a miniature gas-holder if fermentation of the medium occurs. The tubes are finally steamed for twenty minutes on three successive days. For the examination of water 1 cc. is added to each tube, and some 10 to 20 inoculated and incubated at 42° C. for forty-eight hours. If the colon bacillus be present the medium becomes uniformly red, and is permeated with small gas bubbles, while the little tube is filled with gas. If need be, plates may be set from the broth tubes with the bile-salt agar. We have tried both these media and are favourably impressed with the value of the agar medium as means for detecting and isolating both the *B. typhosus* and the *B. coli communis* from suspected material. The bile-salt broth, however, needs to be used with great caution for the examination of waters, as a considerable number of micro-organisms, other than the colon bacillus, are capable of acidifying and fermenting the medium. It is true the majority of these bacteria are closely associated with faecal and similar forms of pollution, but in all cases where this medium gives an apparent or suggestive indication of contamination care should be taken to verify the same by a series of sub-cultures, for identification of species. Among those which produce both acid and gas in this bile-salt broth are *B. coli*, *B. acidi lactici*, *B. lactis aerogenes*, *B. enteritidis* (Gärtner), *B. icteroides*, *B. cloacæ*, various para-colon bacilli, *B. pneumoniæ* of Friedländer, and *B. capsulatus*; while among those which produce acid but no gas are *B. typhosus*, the various dysentery bacilli, the vibrio of cholera, *Proteus vulgaris*, *B. fluorescens liquefaciens*, *B. prodigiosus*, and various staphylococci.

Reference has been made to the use of neutral litmus solution. This is prepared by taking one ounce of powdered litmus and

extracting it with about 500 cc. of distilled water at 80° C. Add acetic acid in excess to the watery solution. The solution is now evaporated on a water bath to the consistence of a thick extract. Add to this extract 100 cc. of a 90 per cent. solution of alcohol, and well rub up the deposit with a glass rod. Next add 50 cc. more, twice in succession, of the same spirit to remove, as much as possible, the precipitate from the dish. The whole is now mixed and filtered. The filter is then well washed with rectified spirit. The contents of the filter should now be dissolved in warm (70° C.) distilled water and diluted to 250 cc. In cases where this neutral litmus solution is difficult to prepare, the ordinary solution (B.P.) of litmus may be used for colouring media, but care must, in all cases, be taken to allow for its alkalinity, as affecting the final reaction of the medium to which it is added. Roughly speaking, 1.5 cc. of the solution has an alkalinity equivalent to 0.4 cc. of decinormal alkali.

Another valuable medium for work upon waters and other materials, suspected of containing the enteric bacillus, is that suggested by Drigalski and Conradi (*Zeitschr. f. Hyg.*, Bd. xxxix., Hft. 2, p. 283), and sometimes called lactose-nutrose-crystal-violet-agar. It is somewhat difficult to make, but amply repays the labour. The procedure is best carried out in the following manner: (a) Allow 3 lbs. of chopped-up meat to stand in 2 litres of water for twenty hours. Boil the fleischwasser for one hour, filter, and then add 20 grammes of peptone (Witte), 20 grammes of nutrose, 10 grammes of salt, and boil again for one hour. Filter, and add 40 grammes of agar. Boil for three hours, make slightly alkaline to litmus, filter and boil once more for half an hour. (b) Take 260 cc. of neutral litmus solution as prepared above, boil it for ten minutes, and add 30 grammes of chemically pure milk sugar. Boil again for fifteen minutes. (c) Now add the hot litmus milk sugar solution to the hot fluid agar (a); shake well and then make slightly alkaline again by adding caustic soda. Take care to hyperalkalinise by adding so much of a hot sterile 10 per cent. solution of water-free soda as will be equal to 4 cc. for 2 litres. Finally add 20 cc. of a freshly made solution of crystal violet (B. Höchst), made by dissolving 0.1 gramme in 100 cc. of warm distilled water.

The resulting medium is virtually a fleischwasser-nutrose-agar containing 13 per cent. of litmus solution and 0.01 per 1,000

of crystal violet. This latter constituent appears to act as a mild antiseptic or inhibitor of saprophytes: if nutrose is not obtainable an analogous casein preparation, such as plasmon, may be used; while for crystal violet either of the solutions of litmus may be employed. The medium, having been prepared, may be then plated, and a loopful of the water or other material being examined stroked in concentric rings over three or four plates in succession. After incubating at 37° C. for forty-eight hours the colonies of *B. coli* will be found to be somewhat opaque and of from a light to a deep red colour. Those of *B. typhosus* will be seen to be of a violet to blue tint, glassy and transparent, not unlike dewdrops. Some members of the *subtilis* group give blue colonies, but in general character as to size and opacity resemble those of the colon group. *B. fluorescens non-liquefaciens*, *B. faecalis alkaligenes* and some others, have a superficial resemblance to the enteric bacillus, but fail to agglutinate with a specific serum.

For general routine work alternative media, to the two already described, are alkaline-litmus-glucose-agar and neutral lactose agar. These contain respectively 2 per cent. of glucose or lactose with 1 per cent. of peptone and 0.5 per cent. of salt. The essential feature of the glucose-agar is the possession of a definite degree of alkalinity, so graduated as to throw into relief the various acid-producing or glucose-fermenting bacteria. For the examination of waters and detection of coli bacteria this alkalinity may be placed conveniently at 15 per cent. of decinormal alkali, but for working on soils or in special quests for the enteric bacilli, an alkalinity equal to 8 per cent. of decinormal alkali is better. The neutral litmus solution or the B.P. solution may be used indifferently. The lactose-agar is best made absolutely neutral. On the glucose agar the colon bacilli will appear definitely red, while the enteric bacilli colonies will be clear, glistening points of a wine-red tint; on the neutral-lactose-agar the colonies of colon bacilli will be red, and those of the enteric organism faintly blue in colour. In working with these media and with the Drigalski-Conradi medium, it is advisable, after pouring or setting the plates, to incubate them face downwards at 37° C. for twenty-four hours; this procedure enables one to see that the plates are sterile and to ensure that the agar surface is dry. Three or four plates, at least, should be stroked in concentric rings from a single loopful of the parent culture.

Although the idea of making use of colour change in bacteriology is not of recent origin, the employment of coloured media has latterly been specially of service in differentiating between *B. typhosus* and *B. coli*. One of the most recent proposals of the kind, and, too, one which has been the basis of a considerable number of papers, is the use of saffranine or neutral-red as a means of detecting the *B. coli* in water supplies and distinguishing it from the enteric bacillus. Rothberger observed that *B. coli* reduced solutions of neutral-red to a colour changing to canary yellow, while *B. typhosus* did not exert any such action. Hunter repeated these observations and further showed that *B. enteritidis* (Gärtner) also reduces neutral-red. Makgill and Savage (*Journal of Hygiene*, 1901, pp. 430 and 437), working independently, came to similar conclusions. They considered that a positive neutral-red reaction, in the majority of cases, points to the presence, and a negative reaction to the absence, of the *B. coli*. The medium recommended by them was glucose broth containing $\frac{1}{2}$ per cent. of glucose, to every 10 cc. of which is added 0.1 cc. of a $\frac{1}{2}$ per cent. aqueous solution of neutral-red. For routine water examination they suggested that to each of a series of tubes of this medium 5 cc. of the sample should be added and the mixture incubated at 37° C. for twenty-four hours. The change of the mixture to a fluorescent yellow colour indicates the presence of the *B. coli*. It is clear that the value of this reaction in water examination depends entirely upon the accuracy of the statement that while the colon bacillus reduces the colour, the *B. typhosus* fails to do so. We have from time to time used this test amongst others for the differentiation of these two micro-organisms. As a rule, the result was as expected, but occasionally the reaction either failed to occur or was so modified that we discarded it as being altogether unreliable.

Whilst working at the cultural reactions of the dysentery bacilli and other micro-organisms intermediate between the colon and enteric bacteria, we have made a certain number of observations upon this neutral-red reaction in both glucose and lactose media, under varying conditions of acidity and alkalinity. These results explain, to some extent, the causes of discrepancies previously noted. In the first place, when working in glucose media containing varying quantities of that carbohydrate, it was noticeable that the *B. coli* was less able to change the colour from red to yellow, in proportion as the percentage of that sugar was increased. Then,

again, when varying amounts of free acid or alkali were added to the medium, it was found that the reducing power of the colon bacillus was much affected, both as to degree and rapidity. Acids seemed more powerful than alkalies, so much so that in order to secure the orthodox or alleged specific change to yellow within twenty-four hours, the acidity should not exceed 5 per cent. of decinormal sulphuric acid. When an absolutely sugar-free broth was used, the notable observation was made that after twenty-four hours even *B. typhosus* was capable of producing a colour verging on orange, as compared with the yellow colour caused by the *B. coli*. The effects of any free acid upon the ability of the colon bacillus to reduce the neutral-red was as marked as in the case of a glucose broth. Finally, a series of observations were made with lactose media, receiving the same amount of neutral-red as in the previous ones. Here, it was found that the general results as to colour were practically the converse to those obtained in glucose; in other words, the ability of *B. coli* to alter the colour lessened, while that of *B. typhosus* increased, the respective degrees of diminution and accretion being in proportion to increased percentages of milk sugar. The effects of varying amounts of free acid and alkali were less evident than in the glucose series. These facts clearly emphasise the unreliability of the neutral-red reaction as ordinarily carried out, and the importance of knowing the reaction as well as what and how much sugar is present in the medium. If neutral red is to be used at all as a differential test between *B. coli* and *B. typhosus*, we are disposed to think that a lactose medium is more reliable than glucose, the ultimate colours produced being respectively a magenta-red and an orange, or just the reverse of what are given in glucose.

REPORT OF THE ROYAL COMMISSION ON THE WAR IN SOUTH AFRICA.

As the actual volumes of this important report are unlikely to be accessible to the majority of members of our Corps, while the evidence contained in their pages cannot fail to be of interest to our readers, we propose giving a *precis* of the evidence so far as it relates to medical organisation before and during the late campaign. For this and future summaries we are indebted to Lieut.-Col. Edwin Fairland.

I.

The Blue Books published are four in number and include the Report of the Commissioners, two books of Minutes of Evidence (22,200 questions and answers) and a book of Appendices or Tables.

The Report deals, among other military matters, with *Army Medical personnel*, and the following points of interest, affecting the Royal Army Medical Corps and the medical service of the army generally have been taken, *verbatim*, from it.

The establishment of medical officers, exclusive of India, was fixed by a Committee in 1888 at the number of 514, and remained practically unchanged until the war, the number estimated for in 1899-1900 being 540. It was intended to provide for (with the addition of ninety-nine civil surgeons) Colonial garrisons, two Army Corps and a Cavalry Division, three general and seven stationary hospitals on lines of communication. If the Army Corps, &c., went abroad and the home hospitals be thus depleted of their staff, the void would be filled by civilians. The ninety-nine civil surgeons would accompany the Army Corps, but they were not registered beforehand, so that the War Office had no claim, as of right, upon any individuals.

The strength of the R.A.M.C. on October 1, 1899, was 3,707 of all ranks, of whom 2,429 were at home, 318 in South Africa, and the rest in the Colonies ; and there were 1,009 in the Reserve.

Surg.-Gen. Jameson said that the establishment was not even equal to peace requirements, because, while the Army had increased during the years preceding the war, the strength had not been increased in corresponding ratio. He had often made representations at the Army Board, but the answer given was that "the trained soldier is the only man you cannot purchase in the open market, and that all the money was wanted for trained soldiers." In the case of medical officers, indeed, the strength had actually been diminished in the process of cutting down estimates, and while the Army had increased, their number had decreased. When the war broke out the whole of the R.A.M.C. *personnel*, officers and men, was exhausted in supplying the First Army Corps, base and stationary hospitals ; these

latter were much in excess of the number calculated in 1888, owing to the great area over which the operations extended. When, therefore, the troops equivalent to the Second Army Corps followed, there were no longer any officers or men of the regular service to supply them fully, and civilians had to be obtained both for South Africa and the home hospitals, where thousands of invalids soon began to arrive. The stock of ready trained N.C.O's. and men was exhausted in the first few months of the war. Altogether, up to the end of the war nearly 8,500 men had been sent out, but "barely a quarter of those men were really trained Army Medical Corps men." Surg.-Gen. Sir W. Wilson said, "The mass of attendants were not trained, we trained them out there." In addition, there were over 800 trained nurses from the Army Nursing Reserve, 2,300 men from St. John's Ambulance Brigade; and some local Hospital and Ambulance Corps in South Africa.

As regards the percentage of medical strength which a force in the field *should* contain, Professor Ogston and Col. E. M. Wilson, R.A.M.C., agreed that 5 per cent. should be the strength; Surg.-Gen. Jameson thought that $2\frac{1}{2}$ per cent. would be sufficient. The actual strength during the war seems to have been from 3 to 4 per cent. of the total forces. Surg.-Gen. Sir W. Wilson said, "The ordinary establishment was too small on the Natal side it was very fair but on the Cape side, where all the difficulties came in, and where we had to go away hundreds of miles from the lines of communication, and where our transport failed, it was a long way too small—out of all proportion."

The non-medical witnesses spoke well, and some very highly, of the zeal and energy of the medical service, though some pointed out that it was often shorthanded, and that the orderlies, many of whom were mere untrained privates brought in as makeshifts, were not always good. Sir Ian Hamilton, while praising their devotion to duty, expressed the opinion that the medical officers were too much shackled by the dread of infringing regulation. One witness said "the medical service was overworked, under-manned, and under-orderlied." It was more easy for medical arrangements to be complete in Natal, with reference to which Sir F. W. Stopford spoke very highly of them, than under great pressure on the Modder River or at Bloemfontein, or with a flying Column in the Transvaal or Orange Country. In any criticisms made upon the Army Medical Service in the field in South Africa, it must be remembered that the task set to them far outstripped the largest expectations which had been formed before the war, with regard to what was expected from this as from other of the departments of the army. Surg.-Gen. Sir W. Wilson said: "The officers I had did everything that was possible; they were few in numbers. I had been supplied with *personnel* to look after two army corps, say 80,000 men, and we had not enough for that number even; but we had 250,000,

besides camp followers. The work was scattered over half a continent, and I really do not think that any one at home knows the amount of the greatness of the task."

Lord Roberts, on the same point, said: "I think the Medical Department suffered under, perhaps, greater disabilities than the other army departments. It was very far from being prepared for expansion, and yet, within a few months, it was called upon to provide officers, N.C.O's., orderlies and nurses for an army three or four times the size of that for which its establishment had been estimated as sufficient. It had been calculated that it would be enough to arrange for medical aid for 4 per cent. of the troops employed in war, whereas it turned out that the calculation should have been 10 per cent.

"Nevertheless, had it not been for the sudden outbreak of an epidemic which is inevitable in war, the department would, in all probability, have proved equal to the occasion; and that the outbreak should have reached dimensions with which we were unable to cope was due rather to the arduous character of our operations, and the nature of our lines of communication, than to want of efficiency and zeal on the part of the medical officers and assistants. It was impossible, under the circumstances, to give the medical supplies precedence on the railway, and to bring up reinforcements of *personnel*."

Professor Ogston speaks disparagingly of the orderlies; most of them were "absolutely ignorant of anything like what was required for attending on the sick. . . . and hence, in spite of all their good-will, they failed from the want of this training."

Sir Frederick Treves, referring to the officers, stated that the Army Medical Service at that date suffered from "over-organisation." The system, he said, "is full of an enormous number of safeguards apparently based on the impression that the officer put in charge of a hospital is likely to be incapable, and that his incapacity will be minimised by restrictions of all sorts." He urged that the whole service needed emancipation from forms and clerical work and decentralisation, so that the medical officers might have more time to practise their profession and acquire greater initiative.

Evidence to the same effect was given by Sir A. Fripp. It was alleged that before the war the Army Medical Service only, as a rule, obtained the less able youths who were entering the profession, and it was pointed out that after they had joined the service they had no opportunity of practising in Civil Hospitals, but were confined to ill-equipped military hospitals, in which the cases were of a restricted class, where the standard of comfort was lower than in a workhouse infirmary, and to which soldiers themselves were unwilling to go.

Surg.-Gen. Jameson considered that the officers entering the A.M.S. were "very much superior," on the average, to those entering the civil

profession. He admitted, however, that for some years before the war, in consequence of want of status and insufficiency of pay, it was difficult to obtain candidates.

The attention of the Commission was called to the fact that in point of opportunities of acquiring skill the British system had long been inferior to that of some foreign countries, that, for instance, of Germany, where not only are the military hospitals much larger and better managed, but where every medical man in the army can, at short intervals, apply to be admitted to the practice of civil hospitals. In Russia, civilian patients are admitted into military hospitals. In this country, if Army medical officers wished to study in civil hospitals, the answer always has been, "We have not enough men, we cannot spare you."

Sir A. Fripp was not in favour of keeping lists of doctors who would be ready to serve in war, but thought that better devised steps should be taken to secure the right men than were taken in the late war. He alleged that A.M.S. officers did not understand the treatment of enteric. "They do now that they have had an enormous experience, but they did not understand how even to write its name down in the slightest cases, because they called it simple continued fever, unless it had very marked symptoms; and they allowed that man with simple continued fever to go about and infect other people, and the other people so infected may have the acutest enteric."

Lord Roberts and others called attention to the hiatus which existed at the time of the war in the Army system with regard to sanitary matters, such, *e.g.*, as the selection of healthy sites for camps or water supply. Surg.-Gen. Jameson said that "If sanitation had been understood not alone by our own officers, but by the rank and file, and the regimental officers, as well as by commanding officers, I think it would have saved thousands of lives." Professor Ogston called attention to the fact that the German Army Medical Corps have an elaborate system for testing the water supply wherever troops arrive, and closing impure sources, but that in South Africa almost nothing of the kind was done. In the regulation of camp latrines, he contrasted unfavourably the British system with the German.

General Sir Chas. Warren confirmed these views, he said: "From the purely medical point of view, the skill, zeal and devotion to duty of our medical officers during the war is beyond all praise. From the sanitation point of view there is much to be desired.

"It never seems to be clear whether a camp is located according to strategic requirements or not, or to what extent the question of sanitation is to be considered. The result is there were grave defects in many of our camps. The duties of medical officers ought to be more clearly defined and their responsibilities laid down."

After calling attention to specific instances of disregard of sanitary considerations, he added: "In the open plains the mounted troops frequently

occupied the best ground before the infantry came up, and the infantry were bivouacked where horses had been. I have always found that in such cases there is sickness. I am convinced that typhoid fever does not belong of necessity to an army in the field ; its presence is usually a sign of neglect of some kind. Wherever real sanitary precautions are taken typhoid fever is at once reduced to a minimum. If there had been efficient sanitary regulations in our Army, and if they had been attended to, I think that three-fourths or four-fifths of our losses from typhoid fever would have been avoided. I consider that our regulations have been retrograde in late years. It is impossible that a Provost-Marshal can look after such matters. His duty ought to be to look after others and see that they do their duty, and not do the duty himself. The whole sanitary service requires recasting. It ought to be automatic, so that on starting a camp or bivouac anywhere things should go straight."

Lord Roberts thought that there ought to be a special service of sanitary officers. He gave as an instance of the need of this that he found hospital tents pitched upon one of the chief sources of water supply at Bloemfontein.

In the opinion of a civilian witness the result of the system before the war was that "there is a general shirking of taking any responsibility of that kind, taking any initiative and daring to do anything that is not already laid down in the regulations." Consequently, even when a site was obviously unhealthy, he considered that officers in the medical service would hesitate to take the necessary steps. Surg.-Gen. Sir W. Wilson desired, like Lord Roberts, that special sanitary experts should be attached to the Army, on the ground that their opinion would have "greater weight than of the ordinary practitioner." He even desired for this purpose "men of European reputation, whose opinions cannot be set aside"—a somewhat large requirement.

Sir Charles Warren suggested that the sanitation of camps and bivouacs should be jointly in the hands of the Royal Army Medical Corps and Royal Engineers, and that their responsibility should be defined. He considered also, that while there was an outbreak of fever the officers concerned should be liable to be tried by Court-martial unless they could show that they had taken all precautions.

(To be continued.)

Current Literature.

I.—MEDICINE AND SURGERY.

Tuberculous Endocarditis.—Brailion and Jousset (*Bulletins de la Soc. Méd. des Hôpitaux de Paris*, July 3, 1903) record a most important case in which tuberculous endocarditis was diagnosed during life. Moreover, the lesion proved to be primary, no other organ being affected. A clinical description of tuberculous endocarditis does not exist. It has simply been a pathological curiosity found at necropsies. In rare instances it has been recognised during life at the end of cases of tuberculosis, but it has been regarded only as a subordinate process in the clinical tableau, the patient dying with it, not from it.

A man, aged 22, who had indulged excessively in alcohol, was admitted to hospital on January 2, 1903. He had suffered since December 28, 1902, from lassitude and fever. He was breathing rapidly, the respirations being 60 to 65 and shallow. Examination of the chest revealed very little; some disseminated, fine, subcrepitant râles were heard at the middle and posterior part of the chest. The heart sounds were muffled. The temperature ranged between 100.4° and 103.6° , and the pulse between 80 and 90. There was albuminuria. From January 10 to 15 large quantities of urine were passed, 3 to 4 litres in the twenty-four hours, and the albuminuria disappeared. Then the quantity of urine became normal. On the 15th a faint systolic murmur was heard at the cardiac apex. It became louder, and by the 22nd assumed the characters of a mitral regurgitant murmur. On the 18th the dyspnœa diminished, and by the 22nd the respiration was normal. The pulse fell to 60 and the temperature to 100.4° . But on February 1 the fever reappeared. The pulse was of the Corrigan type, but there was no murmur of aortic regurgitation. The patient became very emaciated. On the 20th there were cough, muco-purulent expectoration, and large subcrepitant râles. On the 26th he had a "stitch" in the right side, and at the base there were numerous fine subcrepitant râles and slight dulness. Then the case assumed a new aspect. The temperature, which had fallen since February 15, remained permanently below 100.4° after March 5. The quantity of urine fell to from $\frac{1}{2}$ to $\frac{3}{4}$ litre in the twenty-four hours, and there was marked albuminuria. On the 12th the legs were œdematous. The liver extended below the ribs and the cardiac apex was displaced downwards and outwards. Dyspnœa of a different type to that of the onset developed. The respirations were from 30 to 40; inspiration was deep and difficult, all the inspiratory muscles being contracted to the maximum. All over the chest were large subcrepitant râles and slight dulness. The dyspnœa terminated in cyanosis, and death occurred on March 30.

The diagnosis was difficult until blood removed by venous puncture on January 22 yielded tubercle bacilli on culture, and a guinea-pig inoculated with the fibrin developed tuberculosis. Similar results were obtained with blood withdrawn on February 15 and March 27, but inoculated guinea-pigs developed only local (in the lymphatic glands) tuberculosis. The necropsy

on the patient showed extensive but slight pleural adhesions on the left side. The lungs were emphysematous. They showed no sign of tuberculosis but contained numerous infarcts. The liver, spleen and kidneys were swollen from passive congestion. The right side of the heart was dilated and the left ventricle was hypertrophied. The aortic valves were insufficient. On the aortic, mitral and tricuspid valves were vegetations which contained the tubercle bacillus. The writers regard the subacute evolution of the disease and the slight tendency to generalisation (both in the patient and in the inoculated guinea-pigs) as evidence of feeble virulence of the bacillus. The case is a further proof of the value of bacteriological examination of the blood in diagnosis.

Poisoning from Instillation of Atropine into the Eye.—W. G. Rodger (*Glasgow Med. Journ.*, August, 1903) records the case of a man, aged 23, into whose eye two drops of a 2 per cent. solution of atropine were instilled two days after extraction of cataract, at 2.10 p.m., on April 24. At 2.30 he had low muttering delirium and became violent. The face was intensely flushed and the whole body diffusely red. The temperature was 96.8° and the pulse 120, small, and of low tension. He complained of dryness of the mouth and the voice was husky. For two hours he was unruly, grasping articles within reach, laughing, and declaring that he saw strange sights. At 2.30 18 minims of nepenthe, and at 4.30 a hypodermic injection of gr. $\frac{1}{4}$ morphia were given. The pupils were widely dilated. He improved, but low muttering delirium continued during the evening. He frequently attempted to micturate without success. During the night he slept heavily for about eight hours. Between 4 and 5 a.m. there was Cheyne Stokes' respiration for fifteen minutes. At 9 a.m. on the 25th he was quiet and rational, but remembered nothing of the delirium.

The writer finds that of seven recorded cases of poisoning from instillation of atropine into the eye the dose in the present one was the smallest. Small doses are said to reduce the frequency of the pulse, increase the blood tension and elevate the temperature; large doses to produce rapid pulse, low blood pressure, and subnormal temperature. In the present case signs suggestive of a large dose were produced by a small one.

Treatment of Incontinence of Urine in Children.—Robert Hutchison (*Clinical Journal*, June 10, 1903) finds that belladonna is the only drug which has a controlling influence. It must be given in large doses. When attention to the state of the urine, removal of worms or adenoids, if present, withholding fluid before going to bed, and sleeping on a hard mattress with few bed-clothes fail, he gives \mathfrak{m} 10 doses of tr. belladonnæ thrice daily after meals for a week. This will probably at once reduce the frequency of the incontinence. He then increases the dose to \mathfrak{m} 15, \mathfrak{m} 25, and \mathfrak{m} 30, and so on until the incontinence is suppressed. He has no hesitation in going up to drachm doses. The only symptoms produced are slight dimness of vision or dryness of the throat. If when \mathfrak{m} 40 doses are given the incontinence ceases, the drug should be continued for at least a month in the full dose; then it should be gradually discontinued.

Retroversion of the Uterus and Appendicitis.—A case was recently shown by Strassmann before the Berlin Obstetrical and Gynæcological

Society, in which median laparotomy and ventrofixation had been performed for congenital retroversion of the uterus. This method was chosen because as the patient, a woman of 22, had had three attacks of perityphlitis, it was thought that Alexander's operation, though it might cure the retroflexion, would leave the diseased appendix untouched and possibly be followed by perforation and death. But F. Neugebauer (*Centralb. f. Gyn.*, July 4, 1903) employed Alexander's operation in five cases of retroflexion and retroversion of the freely movable uterus complicated by appendicitis with uniformly good results. An incision was made in the inguinal region, and the round ligament was freed and shortened on either side. The right incision was then prolonged upwards and opened the outer border of the sheath of the rectus. The upper end of the right incision allowed free access to the appendix.

The advantages of Neugebauer's operation over median laparotomy are : (1) The retroflexion is corrected aseptically before the appendix is sought for ; (2) the upward prolongation of the right incision leads directly to the appendix. If there were adhesions from previous attacks of appendicitis, or small peri-appendicular residual abscesses which required drainage, a second incision over the appendix would be required in median laparotomy, and the one advantage—the single incision—would disappear. The writer would therefore reserve median laparotomy for those cases of appendicitis complicated by retroversion and retroflexion, in which the uterus is bound down by adhesions.

Ascarides as a Cause of Typhoid Conditions in Children.—Less importance is now attributed to worms as a cause of infantile febrile conditions than formerly. But Desider Barsi (*Wien. Med. Woch.*, August 1, 1903) claims that they may give rise to symptoms resembling those of enteric fever or meningitis. Von Linstow, in 1896, demonstrated that the *Ascaris lumbricoides* produces toxins, a fact which doubtless explains the occasional occurrence of a well-defined "symptom-complex" to which the name *febris typhoides helminthiatica* is applicable. The symptoms may be purely intestinal, or there may be general intoxication with severe cerebral symptoms. In the first case the disease is probably mistaken for enteric fever, in the second for meningitis. In the writer's cases the acute onset was preceded by certain prodromata—anorexia, irritability, and constipation—which usually soon gave place to diarrhoea. In two cases of a cerebral type the period of invasion was marked by rigors and pyrexia, which reached 104° or 105° F. There were violent headache and abdominal pain. These became more severe and finally a state of semi-coma supervened, the children lying apathetic, with constantly rolling eyes. This second stage was characterised by great variations of temperature. Even though the temperature was of an apparently continued type, if it were frequently taken a daily remission or intermission could always be detected. In two cases of an intestinal type the temperature never exceeded 101·8° F. But it presented the irregularities which are apparently characteristic of helminthiatic fever. There were no cerebral symptoms, but the abdomen was extremely tender, especially in the left splenic region. The spleen was not enlarged, and there were no rose spots. In both types of the disease there was diarrhoea with pea-soup evacuations. The tongue was uniformly furred and not of

a typhoid character. The initial rigor which is the rule in helminthiatic fever is rare in enteric. Though the writer has never seen retraction of the head and abdomen, inequality of pupils, or irregularity of the pulse from worms, Marer has recently published a case of intoxication from ascarides in which all the symptoms of meningitis occurred (*Budapesti Orv.*, No. 12). The following cases are typical of the disease:—

(1) A boy, aged 5, became ill with anorexia and headache three weeks before the writer saw him. A week later there was a rigor. The temperature rose to 102.6° , and the pulse was 85. There was well-marked dermatography. He was dull and apathetic, but would answer "yes" or "no" if shouted to. There were pea-soup stools. No abnormal physical signs were present. As two ascarides were passed he was given 2 cg. (about $\frac{1}{2}$ gr.) of santonine every two hours until 8 cg. (about $1\frac{1}{2}$ grs.) had been taken, and the following morning a dose of calomel. A convoluted mass of ascarides were expelled, and five days later, or nearly four weeks from the beginning of his illness, he was convalescent.

(2) A girl, aged 7, had had anorexia and headache for a week or ten days when she was seized with a rigor and pyrexia, and gradually passed into a semi-comatose condition. There were at first no physical signs, but on the fourth day catarrhal pneumonia appeared. The temperature was extremely irregular and ranged from 100.4° to 104° . Ten days later the pulmonary consolidation had completely disappeared, but the irregular pyrexia persisted. In the morning the temperature approached normal and the child was fairly lively. About 3 or 4 p.m. it rose and she became dull and drowsy. The *tache cérébrale* was present. Santonine was given as in Case 1, and brought away at least eighty ascarides. The condition of the child, who was exhausted with pyrexia and constant diarrhoea, improved immediately, and in a few days recovery was complete.

Phlegmonous Gastritis.—Inflammation of the stomach may be circumscribed or diffuse. If circumscribed it may end in the formation of an abscess, if diffuse in purulent cellulitis of the gastric wall. It is a rare disease, but sixty-seven cases have been reported. According to Jacoby it affects males more frequently than females. No age is exempt. The symptoms are those of severe gastritis with epigastric pain and oppression. High fever and prostration are common. The course is usually acute, though in rare cases the disease may be prolonged for months. The diagnosis is difficult; the condition may be suggested by the appearance of an abscess in the gastric region, or of pus in the vomited material. The prognosis is bad, though occasionally recovery occurs. The etiology is clear only in cases in which the phlegmonous gastritis is a metastatic manifestation of an existing infective disease, or in which there is a lesion of the mucosa through which pyogenic organisms may enter the submucous tissue. Such a lesion may be due to caustic poisons, ulcers, tumours, or operations. Errors of diet, chill, and alcoholic excess are probably at most predisposing causes. Klieneberger (*Munch. med. Woch.*, August 4, 1903) reports a case in which iodide of potassium appeared to be the exciting cause of fatal diffuse phlegmonous gastritis.

A man, aged 67, who had never been seriously ill, was admitted to hospital on February 8 with an exacerbation of chronic bronchitis with emphy-

sema. The temperature was normal, and there was no œdema. The urine was normal. Two draughts of $7\frac{1}{2}$ grs. each of potassium iodide and small doses of morphine were given daily. On February 12 the iodide was given three times daily. On February 13, after two doses of the iodide had been taken, running of the nose, sneezing and conjunctivitis appeared. There were also severe vomiting and diarrhœa, with complete anorexia. The iodide was suspended. The temperature rose to 101.3° F. in the evening. Eight hours after the last dose of iodide $4\frac{1}{2}$ grs. of calomel were given. On February 15 there was great epigastric tenderness. The diarrhœa and vomiting ceased and gave place to symptoms of obstruction. The next day he was apathetic and collapsed. The abdomen was diffusely tender. In the left flank was dulness, but elsewhere there was tympanitic resonance. The liver was pushed upwards (tympanites). Death occurred on February 17. There had been no stool since February 14. The diagnosis was emphysema, with chronic bronchitis, broncho-pneumonia of the lower lobes, tympanites, and symptoms of obstruction possibly depending on peritonitis. At the necropsy the small intestines were found matted together with recent lymph. There was thin pus in the recto-vesical pouch. Portions of the omentum were adherent to the pylorus and infiltrated with pus. The splenic flexure of the colon was compressed by the omentum, the greater part of which was displaced to the left. The stomach was distended, and its walls measured three-fifths of an inch in thickness. The thickening was due to diffuse purulent infiltration of the mucosa. At the cardiac end were numerous recent hæmorrhages. The mucous membrane was of a greyish-green colour, and arranged in thick longitudinal folds, into which projected a number of tensely fluctuating abscesses of the size of hazel nuts. The pus contained cocci, which stained by Gram's method.

Thus the gastric symptoms were synchronous with those of iodine. The total amount of iodide of potassium taken was 54 grs. (3.5 gm.). There were no grounds for assuming the gastritis had previously existed. He had always eaten well, and enjoyed his food during the first two days in hospital. Probably some superficial epithelial lesion was produced by the action of free iodine. Through this entered pyogenic organisms, possibly from swallowed bronchitic sputum. In a future case of iodism the writer would wash out the stomach on the appearance of gastric symptoms with a solution of hyposulphite of sodium. Calomel was also given, and the possibility of the lesion having been produced by the soluble double iodide of potassium and mercury must be considered. But this is improbable, for (1) in poisoning by this salt the lower part of the small intestine and large intestine are chiefly affected, gastric changes being slight or absent; and (2) severe gastric symptoms and pyrexia were present before the administration of calomel.

The Treatment of Gonorrhœa.—Although a very large number of drugs have been employed in the local treatment of specific urethritis, the results obtained have not shown any marked curtailment of the disease duration. In the *Riforma Medica*, April 29, 1903, Francesco Re advocates picric acid as an efficient remedy in gonorrhœa. He reports twelve cases, and says that the results were satisfactory and extremely encouraging. An ideal remedy in gonorrhœa should not only act as a destroyer of the

gonococcus, but also antagonise the pyogenic bacteria which are associated with the specific germ in the production of urethral inflammation: the remedy, too, should be a non-irritant and possess the property of penetrating into the lymph channels of the urethral tissues, where the gonococci usually lodge. This combination of therapeutic attributes is difficult to find in any single drug, hence urologists are forced to resort to a variety of substances in the treatment of a case, as the progress of the disease demands. The antiseptic power of picric acid is marked, while, if employed in proper dilution, it is non-irritant. It has, moreover, a definite tendency to penetrate deeply into the mucous membranes. The cases reported by the author were all studied bacteriologically each day. His mode of using this remedy was as follows: In acute cases a 0.5 per cent. solution of picric acid in equal parts of distilled water and glycerine was injected four times daily, by means of a hard rubber syringe. The employment of 1 per cent. solutions caused rapid cessation of all symptoms in two cases, but in some persons is liable to cause inflammatory reaction. The author advises the gradual increase of the strength of the solution from 0.5 to 2 per cent. In chronic cases the 2 per cent. solution may be used at once. As an alternative to the watery solution, Re says that an ointment of 1 or 2 per cent. picric acid in equal parts of vaseline and lanoline, injected by means of a proper ointment syringe, is reliable. The syringe must be passed to the urethral sphincter, gradually withdrawn, and the ointment slowly expelled all along the canal. He reports the most inveterate cases of chronic urethritis to be cured in this manner. The injections of picric acid produce occasionally a slight burning sensation, but in no case was there any complication.

II.—HYGIENE AND PATHOLOGY.

The Leg and Foot in Relation to Marching.—The conformations of the foot and leg in respect of fitness for marching are variously regarded by those engaged in the inspection of recruits. By some the man who has a flat foot is deemed quite unfit to be a foot soldier; by others the possession of "spindle legs" is sufficient to justify rejection for the infantry. Boigey, a French army surgeon, discusses, in *Le Caducée*, June 20, 1903, how far these views are logical and what anatomical conformations are most compatible with fitness for marching. He points out that if we could see those who competed in the foot races and games of prehistoric times we should be astonished in all probability with the anatomical conformations of the contestants, and yet walking or running were the main modes of locomotion in those days. In the same way, if we look at the feet of Negro races of our own day, who are notoriously good walkers, we cannot fail to be impressed with the fact that among them flatness of foot is no impediment to free locomotion. The human foot is composed of three distinct parts—the tarsus, the metatarsus, and the toes. The essential feature in the foot of a good walker is width of tread. The feet of all the lower races show a much wider tread than those of Europeans, so much so that what we term a flat foot is rather the rule with them than the exception. In other words, in respect of arching, the foot of the Negro is intermediate between the highly vaulted foot of the European and the very flat or expanded foot of

the ape. To construct an ideal foot for the foot-soldier it is necessary to critically examine the tarsus, bone by bone, both in our own race and in Negroes. Thus the astragalus (fig. 1) is more spread out in the lower races than in the higher. In these latter the articular surfaces are comparatively small. From these characters it follows that the astragalus more fully overhangs, and is a more perfect key-stone to, the plantar arch in the former races than in the latter. The length of the os calcis (fig. 2) is in direct relation to marching aptitude. It is noticeable that climbing animals have a comparatively small calcaneum, and among the monkeys, those which

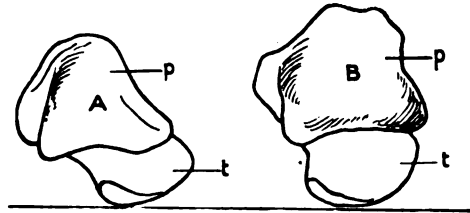


FIG. 1.—A, Astragalus of Negro; B, Astragalus of European.



FIG. 2.—A, Calcaneum of European; B, Calcaneum of Negro.

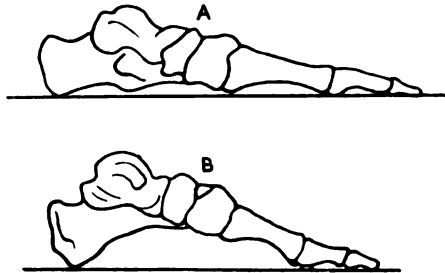


FIG. 3.—A, Foot of Negro; B, Foot of European.

habitually walk as well as climb, this bone is much larger than in those who are essentially climbers. Anthony has described the small apophysis of the calcaneum as the true support of the good walker, and among the lower races it is more developed and nearer the ground than among ourselves. In short, the larger and more prominent the heel, the greater is the fitness of the foot for marching. The study of the plantar arch is intimately associated with that of the angle at which the calcaneum rests on the ground. In all the lower races this angle is very small; it is greatest among adult Europeans, especially those with high insteps (fig. 3). The

comparative study of the scaphoid in different races gives little information. Its inner border, that is, the tuberosity, is more developed and nearer the ground in the lower races; similarly the glenoid cavity by which it articulates with the astragalus is shallower in Whites than in Negroes. The tarsus best fitted for walking or marching is that which is firm, rigid and

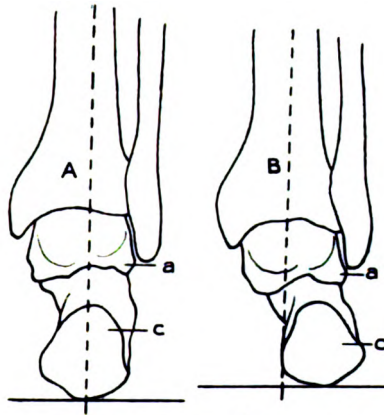


FIG. 4.—A, Normal foot seen from back; B, Foot unsuited for marching seen from the back; a, Astragalus; c, Calcaneum.



FIG. 5.—A, Leg of Negro; B, Leg of European.

well braced together by strong ligaments. It may be compared to an arch supported on three pillars, which are the os calcis and the heads of the first and fifth metatarsal bones. Its great essentials are, strong plantar ligaments and the astragalus placed exactly on the summit of the arch,

for it to transmit the weight of the body evenly to the three supports of that arch. One can form an idea of the right position of the astragalus in normal subjects by drawing a perpendicular line along the axis of the tibia which will coincide with the anatomical axis of the foot. In other words, if the internal malleolus and the tuberosity of the scaphoid do not overhang the inner border of the foot the subject may be deemed well fitted to be a good marcher.

If we attempt to draw any conclusions from these anatomical facts, we cannot fail to be unorthodox in our conceptions as to what is the best form of foot for the foot soldier. The only essential is that the axis of the leg should coincide closely with the anatomical axis of the foot; and that in the case of the greater number of flat-footed men they are not unfitted for marching because their feet are flat, but because the anatomical axis of their feet does not coincide with that of their legs. It may be asked, further, whether there is such a thing as an ideal type of leg for the walker or marcher. Here, again, striking differences in the races are apparent. Fig. 5 shows the leg of a Negro and of a European; in one the lower third is as thick or nearly so as the upper and middle thirds, while in the other there is a marked development and prominence of the gastrocnemius muscle. One must not estimate the mechanical value of a muscle by its apparent volume, but rather by the weight of contractile substance in its mass. And it is precisely because the long muscular bands in the legs of Negroes contain proportionately more contractile substance than do the prominent fleshy calves of the White, that these lean, spindle-shaped and calfless legs belong as a rule to men who are unusually good marchers. Here, as in the case of the foot, it is not the limb conforming to the usual artistic type that is most serviceable, but the exact converse.* L.

Caderas or South American Horse Sickness.—This affection is a very important epizootic which prevails among the horses of Southern America; it is characterised by fever, anæmia and progressive weakness, which passes ultimately to a paralysis of the hind limbs, and invariably ends in death. It has been studied for many years by workers in Brazil and Argentina, but its true nature was not understood until 1901, when Elmassian, in Paraguay, discovered a trypanosoma in the blood of a horse suffering from the disease. Since then a great deal of attention has been devoted to this flagellated organism, notably by Voges, Malbran, Lignieres, Sivori, and Lecler, with the result that an extensive literature has sprung up on the subject, the more important being an article by Elmassian and Migone in *Ann. Instit. Pasteur*, t. xvii., p. 241, one by Lignieres in *Revista Soc. Med. Argentina*, t. x., p. 481, and *Bull. et Mem. Soc. centr. Med. Vet.*, t. x., p. 51, and pp. 109 and 164.

From these articles it would appear that two forms of the malady may be met with; one rapid in its course, lasting from one to eight weeks, the other more chronic and continuing over a period of six months or more. The former type is the only one which has been produced experimentally, and in it the symptoms are acute, with many trypanosomata in the blood.

* For permission to reproduce the diagrams illustrating Dr. Boigey's article we are indebted to the Editor of *Le Caducée*. L. L. L.

In the chronic type, great difficulty is met with in finding the flagellates in the blood microscopically; their presence can only be proved by injecting the blood into other and sensitive animals and by that means giving rise to the acute form of the disease. All these authors dwell upon the great resemblance between caderas and the other epizootics caused by trypanosomata, notably dourine, nagana and surra. The symptoms are specially like those of the two latter affections, except that, in caderas, the paralysis is more marked and there is nearly always lesions of the kidney and not infrequently hæmaturia. All mammals experimented with have been found sensitive, but birds appear to be refractory. The biology of the trypanosoma of caderas has been carefully studied by Lignieres. He shows its great sensibility to heat, a temperature above 40° C. being inimical, while on the other hand it is tolerant of cold and can resist freezing for five days. As to its structure, all observers agree as to its great resemblance to other pathogenic trypanosomata, though it differs from them somewhat in the attachment of its vibratory membrane. The centrosome in the caderas species is not so defined as in the trypanosomata of nagana and surra. Elmassian and Migone describe it as a non-staining refractive point, while Laveran and Mesnil claim to have succeeded in staining it. Whatever may be the differences in structural detail, all these writers agree in maintaining that the trypanosoma of caderas is specific and not the same as the other known pathogenic species. Lignieres has shown that dogs cured of dourine and immune to that disease readily succumb to caderas. Similarly, Laveran and Mesnil, in *Comptes Rendus Acad. Sci.*, t. cxxxv., p. 838, show that a goat and a sheep cured of nagana and immune to that affection are readily infected with caderas, and, moreover, that the serum of nagana animals which is active for the trypanosoma of nagana is inactive towards that of caderas. We may therefore infer that caderas is a morbid entity quite distinct from the other analogous infections. Little appears to be known as to the means by which caderas is disseminated. Sivioli and Leclerc (*Repub. Argent. Anales de Minist. d'Agri. sec. Zootechnia, bacter. vet. y Zool.*, t. i., p. 1, October, 1902) say that by means of certain gad-flies (*Stomoxys calcitrans*) they have been able to infect a healthy horse from an infected one. Under similar conditions Lignieres failed to do so, also Elmassian and Migone are of opinion that, under natural conditions, contagion does not occur usually in this way; in fact, they say that screens of fine wire are sufficient to prevent contagion passing from an infected field to those adjacent to it, as winged insects are not able to carry infection. It has been suggested that possibly the unknown conveyer of infection may acquire the infective organism from one of the rodents, such as *Hydrochærus capibara*, which are abundant on the banks of ditches and streams of the infected areas.

Corps News.

EXTRACTS FROM "LONDON GAZETTES."

ROYAL ARMY MEDICAL CORPS.

Lieut.-Col. E. H. Fenn, C.I.E., to be Colonel, *vice* W. McWatters, retired, dated August 26, 1903.

The undermentioned gentlemen to be Lieutenants, on probation, dated August 31, 1903 :—

Arthur Clayton Horner Gray, Douglas Percival Watson, Thomas Scarbrough Dudding, Carrick Hey Robertson, Francis Montagu Maxwell Ommanney, John Edward Powell, Robert Henston MacNicol, Osburne Ievers, David Duncan Paton, Santiago Luis Pallant, Charles Reginald Bradley, Hugh Herbert James Fawcett, Thomas James Wright, Gerard Ainslie Kempthorne, James Thomas McEntire, Stanley Everard Lewis, Norcott D'Esterre Harvey, Joseph Allen Longley, Norman Edwin Dunkerton, Patrick John Hanafin, Arthur Carr Osburn, Marmaduke Cordeaux Wetherell, Reginald Thomas Collins, William MacDowall MacDowall, Francis John Turner, Harold Crossley Hildreth, Gordon Stewart Mackay, John Duncan Richmond, Forbes Manson Grantt Tulloch, Ernest Mure Glanvill.

The undermentioned Lieutenants are seconded under the provisions of Article 349 of the Pay Warrant :—

C. H. Robertson, dated August 31, 1903 ; J. A. Longley, dated August 31, 1903 ; N. E. Dunkerton, dated August 31, 1903.

Major Henry P. Birch is placed on temporary half-pay on account of ill-health, dated September 14, 1903.

Lieut. Frederick L. Henderson resigns his Commission, dated September 26, 1903. He entered the Service September 1, 1902, and since that date has been seconded.

Lieut.-Col. A. Baird retires on retired pay, dated October 3, 1903. He entered the Service February 3, 1883 ; was promoted Surg.-Major, February 3, 1895 ; and Lieut.-Col., February 3, 1903. His war services were as follows : Bechuana-land Expedition, 1884-1885 ; operations in Zululand, 1888 ; operations in Chitral, 1895, with Relief Force, medal with clasp ; South African War, 1899-1902—relief of Kimberley—mentioned in Despatches, *London Gazette*, February 8, 1901. King's medal with two clasps.

He was commended by G.O.C., Chitral Relief Force. He was thanked by the Commander-in-Chief for services in the South African War.

Lieut.-Col. R. D. Donaldson retires on retired pay, dated October 3, 1903. He entered the Service March 6, 1880 ; was promoted Surg.-Major, March 6, 1892 ; and Lieut.-Col., March 6, 1900. He served in India and Bermuda.

Captain A. C. Lupton, from half-pay, to be Captain, with precedence next below M. M. Lowsley, dated September 5, 1903.

Lieut. D. D. Paton is seconded, under the provisions of Article 349 of the Pay Warrant, dated October 1, 1903.

Lieut.-Col. R. W. Mapleton retires on retired pay, dated October 7, 1903. He entered the Service September 30, 1873 ; was promoted Surg.-Major, September 30, 1885 ; Surg.-Lieut.-Col., September 30, 1893 ; and Brig.-Surg.-Lieut.-Col., November 20, 1896.

His war services were as follows : South African War, 1881—Transvaal Campaign. Served with Natal Field Force. Soudan Expedition, 1885. Suakim. Medal with clasp, bronze star ; South African War, 1899-1900—Senior Medical Officer, Lines of Communication, defence of Ladysmith (P.M.O. Intombi Spruit Hospital Camp), afterwards P.M.O. of a Division, with local rank of Colonel. Despatches (Sir G. S. White, December 2, 1899, and March 23, 1900), *London Gazette*, February 8, 1901.

Captain A. F. Heaton retires from the Service, receiving a gratuity, dated

October 7, 1903. He entered the Service January 29, 1895, and was promoted Captain, January 29, 1898. His war services were as follows: South African War, 1899-1902—Advance on Kimberley, including actions at Belmont, Enslin, Modder River, and Magersfontein. Queen's medal with two clasps; King's medal with two clasps.

Captain E. Brodribb, from half-pay, to be Captain, with precedence next below G. M. Goldsmith, dated September 21, 1903.

Lieut.-Col. R. G. Thomsett retires on retired pay, dated October 14, 1903. He entered the Service September 30, 1873; was promoted Surg.-Major, September 30, 1885; Surg.-Lieut.-Col., September 30, 1893; and Brig.-Surg.-Lieut.-Col., January 26, 1897. His war services were as follows: Afghan War, 1878-1880—Medal; Egyptian Expedition, 1882—medal, bronze star; operations on N.W. frontier of India, 1897-1898—as P.M.O. Peshawur, Col. 5th Brig. Tirah Exped. Force. Medal with two clasps.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Lieut. J. W. Hopkins is seconded for Service under the Foreign Office, dated September 29, 1903.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

The Manchester Companies.—Charles Roberts, Gent., to be Lieutenant, dated September 19, 1903.

The Glasgow Companies.—Quartermaster T. K. Bell resigns his Commission, dated September 26, 1903.

The Manchester Companies.—Lieut. R. W. Beesley to be Captain, dated September 9, 1903.

The promotion of R. W. B. March, which appeared in the *London Gazette* dated September 8, 1903, should read Lieut. H. Marsh, and bear date September 26, 1903.

Lieut. J. T. K. Thomson, Glasgow Companies, Royal Army Medical Corps Volunteers, to be Surg.-Lieut., dated October 14, 1903.

IMPERIAL YEOMANRY.

South of Ireland.—Frederick Faber MacCabe to be Surg.-Lieut., dated September 12, 1903.

VOLUNTEER CORPS.

4th West Riding of Yorkshire Royal Garrison Artillery.—Arthur Mayers Connell, Gent., to be Surg.-Lieut., dated September 19, 1903.

2nd Lanarkshire Royal Engineers.—The undermentioned gentlemen to be Surg.-Lieuts. :—

William Robertson Willis, Thomas Donald Laird, John Lithgow, Samuel Martyn, John Andrew Cook, James Andrew, dated August 1, 1903.

3rd Volunteer Battalion the East Surrey Regiment.—Surg.-Lieut. Alfred Landon Walter Whitehouse resigns his Commission and is appointed Second Lieut., dated September 19, 1903.

2nd (Renfrewshire) Volunteer Battalion, Princess Louise's (Argyll and Sutherland Highlanders).—James Cowe Herbertson to be Surg.-Lieut., dated September 19, 1903.

1st Cheshire and Carnarvonshire Royal Garrison Artillery.—Corbet William Owen, Gent., to be Surg.-Lieut., dated September 9, 1903.

9th Volunteer Battalion (Highlanders) the Royal Scots (Lothian Regiment).—The undermentioned Surg.-Lieuts. to be Surg.-Capt. :—

K. Mac K. Douglas, dated August 14, 1903; J. Mowat, J. Cumming, dated August 31, 1903.

2nd Volunteer Battalion the Oxfordshire Light Infantry.—Surg.-Capt. J. O. Sankey to be Surg.-Major, dated September 26, 1903.

1st Dumbartonshire.—Farquhar Gracie to be Surg.-Lieut., dated September 26, 1903.

19th Middlesex (Blossbury).—Surg.-Capt. J. G. Fraser to remain Supernumerary whilst in command of the 5th London Volunteer Infantry Brigade Bearer Company, dated July 25, 1903.

3rd Kent (Royal Arsenal).—Surg.-Major A. H. Robinson to be Surg.-Lieut.-Col., dated October 3, 1903.

1st Monmouthshire.—Surg.-Capt. W. E. James resigns his Commission, dated October 3, 1903.

1st Gloucestershire Royal Engineers.—Surg.-Capt. G. H. Ward-Humphreys resigns his Commission, dated October 3, 1903.

1st Sussex Royal Garrison Artillery.—Surg.-Lieut. F. Laud resigns his Commission, and is appointed Captain, dated October 10, 1903.

1st Volunteer Battalion the East Yorkshire Regiment.—Arthur Tinsley Sissons, to be Surg.-Lieut., and to be borne as Supernumerary whilst doing duty with the Yorkshire Volunteer Infantry Brigade Bearer Company, dated April 4, 1903.

4th Volunteer Battalion the Queen's Own (Royal West Kent Regiment).—Lieut. W. J. Woodman resigns his Commission, is appointed Surg.-Lieut., and is borne as Supernumerary whilst commanding the West Kent Volunteer Infantry Brigade Bearer Company, dated October 10, 1903.

MEMORANDA.

Lieut.-Col. T. J. P. Holmes, retired pay, late Army Medical Staff, to be Colonel under the provisions of Article 664, Royal Warrant for Pay and Promotion, October 26, 1900, dated October 3, 1903.

VOLUNTEER INFANTRY BRIGADE BEARER COMPANIES.

The Gordon, the formation of which was announced in the *London Gazette*, dated May 5, 1903, ceases to be an independent unit.

5th London.—The following announcement is substituted for that which appeared in the *London Gazette*, dated July 28, 1903 :—

Supernumerary Lieut. J. G. Fraser (Surg.-Capt. 19th Middlesex Volunteer Rifle Corps), to be Captain, and to command, under paragraph 55a, Volunteer Regulations, dated July 25, 1902.

South Yorkshire.—George Herbert Leonard Hammerton to be Lieut., dated October 10, 1903.

Yorkshire.—The appointment of Arthur Tinsley Sissons, which was announced in the *London Gazette* of April 3, 1903, is cancelled.

EXTRACTS FROM ARMY ORDERS.—A. O. 170 intimates that officers on appointment to a unit whose mess has been furnished at the public expense will not be required to pay any mess contribution. The contribution to the mess levied on an officer on promotion, transfer, or exchange, will likewise cease to be payable in units having publicly furnished messes. This order will take effect from the date on which messes have either been furnished at the public expense, or when the existing furniture has been taken over and become public property. Paras. 948 to 954, King's Regulations, will become inoperative in the case of all messes furnished at the public expense, and these regulations will be amended accordingly.

A. O. 172 gives a list of soldiers to whom the Medal for Distinguished Conduct in the Field has been awarded; among the recipients we are glad to see the name of Staff-Sergt. G. C. W. King, of the Corps. We made a reference to this award in our last issue. An Appendix to A. O. 172 includes among the recipients of Medals for "Long Service and Good Conduct," the following Non-Commissioned Officers and men of the Corps: 662 2nd Class Staff-Sergt. E. Ross, 5738 Sergt. T. H. V. Coad, 7558 1st Class Staff-Sergt. T. Hedley, 6648 1st Class Staff-Sergt. R. Hughes, 6693 Pte. W. H. Brown, 11420 Pte. E. McCormack, 5470 Pte. J. M. Wheeler, 6380 1st Class Staff-Sergt. F. E. Thurgate, 6658 1st Class Staff-Sergt. P. Plunkett, 6274 Pte. W. Brogden, 6387 1st Class Staff-Sergt. W. Shannon, 6700 1st Class Staff Sergt. J. Wright, 6390 Lance-Sergt. E. A. Campbell, and 6688 Pte. A. J. Griffiths.

A. O. 173 intimates that on and after January 1, 1904, the certified copies of the Registers of Births, Deaths and Marriages which take place among British troops serving abroad (Army Forms A 42, A 43, and A 44 respectively) will be rendered, on January 1 and July 1 in each year, by officers commanding every unit or detachment, and by the head of every department abroad, to the G.O.C. of the station, and will be forwarded by him without delay direct to the Registrar General, Somerset House, London. G.O.C.'s will communicate direct with the Registrar-General

in connection with these returns. The original registers, Army Books 112, 113, and 114, when filled up, will also be forwarded direct to the Registrar-General, from whom supplies of these books will in future be obtained. Para. 2182 of the King's Regulations will be amended accordingly.

NOTES FROM ALDERSHOT.—The Annual Meeting of the Depôt Rifle Club was held on September 2 at Ash Ranges, and was an unqualified success. A changeable wind militated against sensational scoring, but the shooting was nevertheless very satisfactory. The following is a list of prize winners in the different competitions.

Prize for Warrant Officers and Sergeants.—1st, 2nd Class Staff-Sergt. Cox; 2nd, 2nd Class Staff-Sergt. Collier; 3rd, Sergt. Hinton.

Prize for Corporals.—1st, Lce.-Corpl. Chappell; 2nd, Corporal Yeoman; 3rd, Corpl. Bullock.

Prize for Privates over twelve months' Service.—1st, Pte. Pollington; 2nd, Pte. Coventry; 3rd, Pte. Papworth; 4th, Pte. Burgess; 5th, Pte. Dudley.

Prize for Young Soldiers.—1st, Pte. Bogosoff; 2nd and 3rd, Ptes. Hooton and Dennis, tied; 4th, Pte. Pert; 5th, Pte. Bidgood; 6th, Pte. Cheetham.

Prize for Magazine Independent—all Ranks.—1st, Pte. Pollington; 2nd, Sergt. Ford; Special Prize, 2nd Class, Staff-Sergt. Collier; 3rd, Sergt. Hinton; 4th, Pte. Coventry; 5th, 2nd Class Staff-Sergts. Green and Gregg (divided).

Challenge Shield and Prize—all ranks.—2nd Class, Staff Sergt. Collier.

Prize for Officers.—Major McLoughlin.

On September 19 the members of the Depôt Sergeants' Mess met at Ash Ranges to decide possession of the Corps Challenge Trophies. The weather being fine a pleasant day was spent. The shooting was generally very good. A list of winners of prizes is appended.

The Hammerton Cup and Prizes.—Cup and 1st Prize, Staff-Sergt. G. Collier; 2nd, Staff-Sergt. R. Cox; 3rd, Sergt. O. Ford; 4th, Sergt. R. Smith.

The Lilywhite Cup and Prizes.—Cup and 1st Prize, Staff-Sergt. G. Collier; 2nd, Staff-Sergt. R. Cox; 3rd, Sergt. R. Smith; 4th, Sergt. J. Hinton.

Magazine Independent Competition.—1st Prize, Staff-Sergt. A. Green; 2nd, Staff-Sergt. J. Gillespie; 3rd, Staff-Sergt. R. Smith; 4th, Staff-Sergt. R. Cox.

The prize for the aggregate for the day was won by Staff-Sergt. G. Collier.

NOTES FROM SALISBURY PLAIN.—The Medical and Ordnance Equipment of a Field Hospital and a Bearer Company having been put at the disposal of the 2nd Army Corps by the War Office for instructional purposes, an R.A.M.C. Camp of Instruction was opened at Bulford on Salisbury Plain at the beginning of July, 1903. Lieut.-Col. Deane, R.A.M.C., acted as Commandant, with Major W. T. Swan, R.A.M.C., as Adjutant and Lieut. and Quartermaster W. Duncan, R.A.M.C., was Quartermaster. Sergt.-Major G. W. Tothill, R.A.M.C., was Sergt.-Major, and Staff-Sergts. G. W. Marsland, and C. W. Measure, R.A.M.C., were Sergeant Instructors. Officers, Non-Commissioned Officers and men were brought up from the Western, Southern, and South-Eastern Districts, and were put through a course of Field Training in Bearer Company and Field Hospital work; the course lasted fourteen days, and at its conclusion those who had been put through returned to their stations, and were replaced by a similar number.

This Camp of Instruction was used as a Depôt for organising the Field Units that were to take part in the Army Manœuvres; these consisted of three half Field Hospitals attached to the 5th and 6th Divisions and Corps Troops respectively of the 2nd Army Corps. A Bearer Company was also mobilised and divided into three sections, each section doing duty with each half Field Hospital. The personnel of these units was drawn chiefly from districts in the 2nd Army Corps Command, and from Netley. A considerable number of Officers, Non-Commissioned Officers and men were detailed by the War Office; the Non-Commissioned Officers and men thus detailed coming from Aldershot chiefly.

In addition to these Field Medical Units, an officer was attached to each brigade of Artillery and Infantry, and two to the Cavalry Brigade. Each Field Hospital had three Medical Officers, and the proportion of Non-Commissioned Officers and men laid down in War Establishments. The 5th Divisional Field Hospital was commanded by Captain Tibbits, R.A.M.C.; the 6th Divisional Field Hospital

by Major H. T. Baylor, R.A.M.C., and the Corps Troops Field Hospital by Major W. T. Swan, R.A.M.C. The three sections of the Bearer Company were commanded by Major F. Smith, D.S.O., R.A.M.C., and Lieuts. J. and D. Carmichael, R.A.M.C., respectively. A Base Hospital of 200 beds was established at Devizes, with Col. W. Donovan, C.B., as Principal Medical Officer of the Lines of Communications; the Staff of Royal Army Medical Corps was derived chiefly from Bulford Garrison Hospital and Portsmouth, Major Clement, R.A.M.C., being sent from the former station to assist Lieut.-Col. Ambrose in working the Hospital. An Ambulance train, made up of two ambulance carriages from Netley, and three other carriages working between the Base Hospital and the troops in the field was used, and removed the sick with great expedition and comfort.

The 2nd Army Corps was concentrated at Corsham on September 12, 1903. The two divisions marched from Salisbury Plain to Corsham in very stormy weather, but, notwithstanding the exposure, they did not appear to suffer very much. The Surg.-Gen. of the Army Corps was present at the manoeuvres, while Col. R. H. Quill, R.A.M.C., Principal Medical Officer, South Eastern District, acted as Principal Medical Officer of the 5th Division, and Lieut.-Col. G. E. Weston, R.A.M.C., was Principal Medical Officer of the 6th Division. The actual manoeuvres began on September 14, 1903, and lasted for four days. The troops did a good deal of hard marching, and there was the usual crowd of men with blistered feet; but no serious sickness had, fortunately, to be contended with. The weather was cool and pleasant, and there were no cases of exhaustion. During the manoeuvres both Principal Medical Officers of Divisions and the Senior Medical Officer of the Corps Troops spoke very highly of the marching of the Royal Army Medical Corps, who carried out their duties with cheerfulness and in a manner creditable to the Corps.

NOTES FROM SINGAPORE.—Our Correspondent, Lieut.-Col. Dick, sends us the following items of news from the Straits Settlements. On July 4, at a monthly meeting of the Malaya Branch of the British Medical Association at Raffles Institute, Singapore, Major J. Ritchie, R.A.M.C., read a paper on "The Fevers of West Africa." He described the various types of fever he met with in a fifteen months' tour in West Africa, and gave his reasons for believing that many cases described as blackwater fever were really cases of yellow fever, which he considered existed to a much greater extent in West Africa than was admitted generally. In discussing the etiology of malaria he gave his opinion that the mosquito was not the only vehicle for the transmission of the parasite, though he admitted the great services of those investigators who had proved the part the mosquito plays. He also, in concluding, stated his views as to the preventability of the present large death-rate in West Africa. He strongly held that by general sanitary reforms, which were very urgently required, and by attention to personal hygiene on the part of the individual, the great mortality among Europeans in West Africa could be reduced to that of other tropical stations. An animated discussion followed.

Though the strength of the Corps is too small to allow of their taking any part as a corps in game competitions, it is gratifying to find that the officers distinguish themselves individually. Thus, Major J. H. E. Austin, before his departure on leave, signalled himself by winning the lawn tennis championship. Capt. N. A. Woodside always wins a good place in the monthly golf competitions, while Lieut. Sheehan captains the Garrison Association Football Team.

NOTES FROM WEST AFRICA.—Writing from Sierra Leone, Major A. Pearse sends us the following interesting letter regarding local affairs:—

"The arrival of the first number of the Journal took most of us by surprise. All were, however, delighted to know that the long-looked-for Journal of the Corps was at last an accomplished fact. It is always pleasant to hear something about what has been taking place in our own particular branch of the Service, at home and abroad. The numerous subjects of universal interest and the many items of Corps News which it contains will undoubtedly make it most deservedly popular with all who have the well-being of the Corps at heart, and especially with those who have the good fortune or bad, as the case may be, to serve on the West Coast of Africa.

"Local Corps News is scarce and far from exciting, but it may interest some to know who is out here and what they are doing, as well as to hear something

about the military medical arrangements on the West Coast, or rather in Sierra Leone, this being the only colony on the West Coast in which R.A.M.C. officers are employed during times of peace. It will, perhaps, be most convenient first to say something about the position and the garrisons of the various stations in the Colony and Protectorate; then to give the distribution of the medical officers at these stations, and lastly, to add a few remarks on points which strike one as likely to make the Corps more efficient out here and to place it in a better position to carry out those duties, scientific or otherwise, which it is so frequently called upon to perform. These suggestions are only intended to show that were something of the kind carried out it would enable those whose lot it is to serve in this unhealthy climate to do a little for others similarly situated, not only here but also in other parts of the British Empire, which have almost an equally bad reputation.

"Freetown, the chief town in the Colony of Sierra Leone, is situated on the sea-coast and has an excellent harbour, in fact, the best on the West African coast, and is in consequence a most important place in this part of the world, more especially now after the Boer War. The headquarters of both the Military Command and the Colonial Government are here. The troops, namely, the Headquarters and five companies of the West India Regiment, are quartered in barracks at the top of Tower Hill, about 150 feet above sea-level, and surrounded on all sides by the town. About two miles from Tower Hill, and some 600 feet above it, is the station of Mount Aureol where the European Company of Royal Garrison Artillery and two companies of the West India Regiment are quartered; a third company being stationed at Kortright Hill, which is rather more than a quarter of a mile up the same ridge, with an elevation of 900 feet above the sea. Three miles from Tower Hill, in a south-westerly direction, and some four miles from Mount Aureol, is Wilberforce. The headquarters of the West African Regiment is here, and in the near future it is to be made the headquarters of the Colonial Government also. It is not so high as Mount Aureol, having an altitude of about 450 feet only. Some forty miles up the river from Freetown is Port Lokkoh, where a company of the West African Regiment is stationed, and still further up country are Magbele and Mabanta, twelve and thirty miles from Port Lokkoh respectively, each with a garrison of one company of the same Regiment. These three stations are in the Protectorate.

"Such are the chief points of interest regarding the position of and the garrisons at the various stations of the Colony, the distribution of the medical officers in the command to these different stations at present being as follows:—

At Tower Hill	.. .. .	Major A. A. Sutton, D.S.O., Capt. T. J. Crean, V.C., Lieut. C. G. Thomson.
At Mount Aureol	.. .. .	Major A. Pearce, Lieut. C. V. B. Stanley.
At Wilberforce	.. .. .	Capt. A. G. Thompson.
At Port Lokkoh	.. .. .	Capt. P. J. Probyn, D.S.O.
At Magbele	.. .. .	A non-European Civil Surgeon.
At Mabanta	.. .. .	Capt. R. L. Argles.

"The hospitals at Tower Hill and Mount Aureol, with the latter of which is included a small hospital at Kortright Hill, are ordinary dieted garrison hospitals, but those at Wilberforce and the three up-country stations are non-dieted. The Military Medical Corps in West Africa consists of non-commissioned officers and men drawn from the West India and West African Regiments, who, after a probationary period at one of the hospitals are, with the approval of the Senior Medical Officer and their respective commanding officers, placed in what is called 'the Fixed Hospital Establishment.' They are under the medical officer for discipline, but draw their pay and clothing from their regiments, and except for the Geneva Cross on the arm the uniform is indistinguishable from that of any other man in their regiment. They receive extra duty pay but no Corps pay, and their promotion depends in many cases on the good will of the regiment or the return of the individual to regimental duty. There is little or no encouragement for them to try and improve, as a private employed temporarily in the hospital receives exactly the same extra duty pay as one who may have been several years on the fixed hospital establishment. This arrangement is hardly one which would tend to make any Corps thoroughly efficient. During the last year companies of (Sierra Leone) Royal Garrison Artillery have been raised from men recruited both locally and in the West Indies, and a somewhat similar plan might well be adopted for the Royal

Army Medical Corps. A company of (Sierra Leone) Royal Army Medical Corps would greatly improve the military medical arrangements here, and at the same time place the Corps in such a position that it would be able to meet any sudden emergency that may arise. The company could be raised from the present fixed hospital establishment, probationers from the local Corps, and recruits obtained from among the better educated natives of the Colony. With an increase in the number of officers and the assistance of one or two non-commissioned officers of the Corps, there should be little difficulty in forming a local company of the Royal Army Medical Corps which would be able to carry out any duty it might be called upon to perform. And further, most of the men recruited in this way would be serving in their own country, and therefore perfectly able to stand the climate, which would be an undoubted advantage in many ways.

"Before closing this letter it would be as well to draw attention to the fact that here, in a country so notoriously unhealthy as to have earned for itself the unenviable reputation of being the 'White Man's Grave,' there is no hospital to which sick officers have a right to go if they wish. By the courtesy of the Colonial Government, officers can generally go to the Colonial Nursing Home when there is a vacancy, but this is a state of affairs which should not be allowed to continue in a climate such as this is. One more point requires attention and that is, the time for and means of carrying out scientific research on the spot is wanting. The field for study of many practically unknown diseases on the West Coast is almost unlimited, but the means are not at hand, and the time is not always available at the right moment, leaving out of consideration the fact that in an enervating climate such as this it is only the more robust and energetic that are able to attempt more than the ordinary routine work of every-day life."

THE GLASGOW COMPANIES (R.A.M.C.Y.)—These Companies are reported now to be up to full strength. During the latter part of July they were under canvas at Netley for annual training, under the command of Lieut.-Col. Beatson, C.B., V.D., the other officers present being Capts. Moyes and Reid, Lieuts. Edington, Young, Charteris, Bruce Gordon and Walker, with Quartermasters Lee and Walker and the Adjutant. As on former occasions, the course of training undergone was of a thoroughly practical and instructive character. The N.C.O.'s were attached to the Wardmasters, while the privates were told off for duty with the R.A.M.C. orderlies. Lectures and clinical instruction in nursing and handling of helpless patients were given by officers of the Corps and by the Nursing Staff at the Royal Victoria Hospital, and were much appreciated by the men. A very enjoyable break in the routine of hospital duties were the Camp Sports, which were held on the recreation ground. The chief event in the programme, the inter-divisional tug-of-war, was carried off by the R.A.M.C. regulars, a team in which, it was noticeable, were some who formerly belonged to Glasgow. The Pipe Band of the companies was well to the front and have become established favourites. The Transport section, under the command of Lieut. McIntosh, M.V.O., with Quartermaster Singer, underwent their course of training at Aldershot, being attached to the A.S.C. there, and had a thoroughly practical training.

EXCHANGES.—The following exchanges have been approved; Majors J. J. C. Donnet, W. P. Squire, H. Carr, F. A. Saw, J. Moir and T. G. Lavia.

POSTINGS.—Lt.-Col. S. Westcott to Shoburyness.
Lieut.-Col. R. E. R. Morse to N.E. District.
Lieut.-Col. E. L. Maunsell to Gosport.
Major J. E. Brogden to Netley.
Capt. St. J. B. Killery attached to Scots' Guards.
Capt. E. Brodribb to Aldershot.
Lieut. J. L. Jones to Woolwich.
Capt. J. C. B. Statham to Woolwich.

SERVICE ABROAD.—The following additional officers have been warned for service abroad:—Lieut.-Cols. G. J. Coates and E. O. Wight; Major C. J. Healy; Capts. A. C. Fox and A. C. Lupton; Lieuts. A. B. Smallman; W. F. Tyndale, C.M.G.; P. Davidson, D.S.O.; J. McKenzie, W. B. Taylor, N. D. Walker, and C. W. Holden

EMBARKATIONS (India).—Lieut.-Col. F. N. Treherne, Majors G. E. Hale, D.S.O.; G. Raymond, G. F. H. Marks, W. T. Mould, and F. MacDowell; Capts. E. H. Condon, A. W. Hooper, D.S.O.; C. W. Profeit, W. Tibbits, J. F. Martin, A. O. B. Wroughton, D. O. Hyde; Lieuts. R. J. Franklin, J. M. H. Conway, A. Rutherford, W. W. Browne, W. D. C. Kelly, H. G. Pinches, W. C. Rivers, H. G. S. Webb, A. H. Hayes. *Bermuda*, Major J. Paterson. *Egypt*, Capt. W. D. Erskine. *West Coast of Africa*, Lieut. J. W. S. Secombe. *Somaliland*, Major J. W. Jennings, D.S.O.; Capt. H. N. Dunn, D.S.O.

MARRIAGES.

GALLIE—CRIGHTON.—On September 24, at All Saints', Hove, by the Rev. Canon H. S. Tyers, M.A., assisted by the Rev. Prebendary T. Peacey, M.A., Vicar, Capt. James Stuart Gallie, R.A.M.C., elder son of the late John Gallie, of Queenstown, Ireland, to Florence Ostle, only daughter of Charles Edwin Crighton, of 10, Albany Villas, Hove, Sussex.

BABTIE—HAYES.—At the Cathedral, Westminster, on September 5, by the Rev. F. O'Hara of Wimbledon, Lieut.-Col. W. Babbie, V.C., C.M.G., R.A.M.C., to Edith Mary, widow of Major P. A. Hayes, A.M.S., and daughter of the late W. Barry, Esq., of Ballyadam, Co. Cork.

DEATHS.

ASH.—Lieut.-Col. R. V. Ash died at Morecambe on September 18. He entered the Service on September 30, 1871, and retired in November, 1891. He had served in S. Africa, Egypt and India. His war services include the Zulu Campaign of 1878-9, the Egyptian Expedition of 1882, including the battle of Tel-el-Kebir, and the Burmese Expedition of 1886-7. Since 1893 Lieut.-Col. Ash had been in medical charge at Fleetwood, Lancs.

HARE.—Lieut.-Col. G. Hare died on September 14. He entered the Service on October 1, 1867, and retired in July, 1890. His service had been principally in India and Bermuda.

SHARPE.—Major A. Sharpe died in Dublin on August 19. He entered the Service on February 5, 1881, and retired in January, 1897. He served for a short time in India, but also for some while on the West Coast of Africa.

TUKE.—Major G. J. A. Tuke died in St. Thomas's Home on October 12, being on leave from Gibraltar. He entered the Service in August, 1885, and had served in India and S. Africa, including the recent campaign.

ANNOTATIONS.

SURGICAL EXPERIENCES IN THE BOER WAR.—We are asked by Surg.-Gen. Stevenson to say that the skiagrams which illustrated his article on this subject, in the August number of this Journal, were taken by Mr. Lionel Sells. By an oversight this fact was not mentioned.

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE — The following extracts are made from the *London Gazette* :—

Miss H. W. Reid is appointed a Matron, dated October 14, 1903.

Miss J. M. Clay is appointed a Sister, dated October 1, 1903, and posted to Portsmouth for duty.

Miss M. H. McLeish resigns the Service, dated October 14, 1903.

Miss E. L. C. Crowe is appointed a Staff Nurse, dated August 12, 1903, and posted to the Connaught Hospital, Aldershot.

Miss K. M. Hewetson is appointed a Staff Nurse, dated October 2, 1903, and posted to the Royal Military College, Sandhurst.

Miss L. E. Mackay is appointed a Staff Nurse, dated September 23, 1903, and posted to Alton for duty.

NOTICE TO SUBSCRIBERS.

THE Editor will be glad to receive original communications upon professional subjects, travel and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Capt. W. S. Harrison, Lieut.-Col. Whitehead, Capt. L. W. Harrison, Lieut. J. T. K. Thomson, Surg.-Capt. D. M. Greig, Major S. F. Clark, Major C. H. Hale, Major F. Smith, Capt. Statham, Col. Howard, Capt. J. H. P. Graham, Capt. Blake-Knox.

The following periodicals have been received : *The Medical Record*, *The Medical News*, *New York Medical Journal*, *Gazette Med. de Paris*, *Il Morgagni*, *The Medical Review*, *El Siglo Medico*, *Der Militärarzt*, *Deutsche Militärärztliche Zeitschrift*, *Anales de Sanidad Militar*, *Revue Med. de la Suisse Romande*, *La Medicina Militar Española*, *The Boston Medical and Surgical Journal*, *Annali di Med. Navale*, *Giornale del Regio Esercito*, *Le Caducee*, *The Hospital*, *The Ophthalmoscope*, *The Asylum News*, *St. Thomas's Hospital Gazette*, *Bulletin de l'Acad. de Med. de Paris*, *Arch. Med. Belges*, *Voyenno Medisinskii*; also the following books. "Handbook of the Gnats and Mosquitoes," by G. G. M. Giles. "Squint, its Causes, Pathology and Treatment," by C. Worth. "The Ambulance in Civil Life," by R. Harrison. "Diseases of Warm Climates," by B. Scheube. "Practical Details of Cataract Extraction," by H. Herbert. "Studies in Laboratory Work," by C. W. Daniels. "A Simple Method of Water Analysis," by J. C. Thresh.

All Applications for Advertisements to be made to—
G. STREET & CO., LTD., 8, SERLE STREET, LONDON, W.C.

Journal
of the
Royal Army Medical Corps.

Original Communications.

THE BACTERIOLOGY OF ASYLUM DYSENTERY.

BY CAPT. R. T. BROWN.
Royal Army Medical Corps.

I PURPOSE in this paper to detail the results obtained during a preliminary investigation of the bacteriology of Asylum dysentery and colitis, which we find scattered about throughout the different asylums and occurring either in single instances or in a more or less epidemic manner. Thanks to the exertions of Mott and Durham, who have so clearly proved the close connection which these diseases have with filth, careless nursing, &c., epidemics, once so general and persistent, are now to a large extent things of the past.

Preparatory to this investigation I made a comparative study of several strains of the *Bacillus dysenteriae*; these strains were obtained from the following sources:—

- No. 1 (Mott).—From the gall-bladder of an Asylum patient suffering with dysentery.
- No. 2 (Flexner-Strong type).—From the stools of a case of dysentery.
- No. 3 (Duval, summer diarrhoea).—From the stools of a case of infantile summer diarrhoea.
- No. 4 (Duval, Asylum diarrhoea).—From the stools of a case occurring in an epidemic of Asylum dysentery at New Haven.

No. 5 (Shiga).—From the stools of a case of epidemic dysentery in Japan.

No. 6 (Flexner, "Harris" type).—From the stools of a case of acute dysentery in Manilla.

No. 7 (Shiga).—Also from Japan.

The seven strains showed the following points of similarity :—

Character : Short rods with rounded ends of varying lengths, and but rarely forming threads. *Motility* : Slow and laboured. Active Brownian movement. *Spores and Flagella* : None could be demonstrated. *Staining* : Well with the aniline dyes. Decolourised by Gram's method. *Growth in broth* (twenty-four hours) : Very slight turbidity ; (forty-eight hours) good general turbidity ; (three days) marked turbidity with small, dirty-white deposit, which gradually increases in amount while the supernatant broth becomes a little clearer. At no time is there any growth on the surface in the form of a pellicle. *Growth in dextrose broth* (twenty-four hours) : Slightly acid, no gas. No change in later stages. *Growth in lactose broth* (twenty-four hours) : General turbidity, no gas, small, dirty-white, ropy deposit. Later, increase of deposit. *Growth in saccharose broth* (twenty-four hours) : General turbidity, no gas, no deposit. On seventh day small, dirty-white, granular deposit. *Growth in nitrate broth* (four days) : Nitrites present. *Growth in lead broth* : No sulphuretted hydrogen formed. *Growth in gelatine stab* (twenty-four hours) : No apparent change ; (forty-eight hours) slight white growth along whole length of stab which does not increase beyond a definite haze. There is a slight surface growth round edge of stab, but no liquefaction. *Growth in gelatine shake* (twenty-four hours) : No apparent change ; (forty-eight hours) slight turbidity, no gas. *Growth on gelatine streak* (twenty-four hours) : Very slight, almost transparent, moist, glistening growth along lower half of streak, especially towards the bottom ; (forty-eight hours) growth increased, resembling "white of egg," and slightly raised. Many discrete colonies along its side. Spreads gradually in a lateral direction, getting more opaque, with slightly crenated edge, and at no time showing any liquefaction. *Growth in glucose formate gelatine shake* (twenty-four hours) : Very faint haze ; (four days) general haze at top, minute colonies in substance, slight, dry, granular growth on surface. *Growth on agar streak* (twenty-four hours) : Almost transparent white, raised, moist growth, many discrete colonies

along edge; (three days) increased but slowly. *Growth on blood agar*: (twenty-four hours) raised, moist, glistening growth, with spreading crenated edge, centre more raised, more transparent edge, more profuse growth than on agar. *Growth on potato* (twenty-four hours): Dirty, brownish-white growth, moist, raised and slightly spreading, which gradually increases and gets more moist, until the fifth or sixth day, when it tends to run over the cut surface of potato and soon after dries up. *Anaërobic growth in glucose formate broth* (twenty-four hours): Flaky growth, no gas. Later, growth slightly increased and forms deposit. The following are points of dissimilarity in the cultures: *Growth in bile salt solution*: Slightly acid with no gas, except strain 1, which was strongly acid without gas in twenty-four hours, and in six days almost entirely free from colour. *Indol reaction*: Tested on fourth day culture in Dunham's solution, immediately and after two hours. Strain 1 gave positive reaction; 3 gave indications of minute traces of indol immediately; 2, 4, 5, 6 and 7 gave negative results. *Growth on gelatine plate*: 1 (Mott) *Surface colonies*—circular even margin, brown colour, wavy lines from central point, especially towards the edge, which is quite clear for a very short distance. In a few days there is no clear edge. The central point is well defined and very coarsely granular. *Deep colonies*—circular, even edge, rarely lenticular, of brown dotted appearance. 2, 3, 4, 5, 6 and 7 same as 1 (Mott), except absence of marked central point and wavy lines, colonies were of a coarse granular appearance, deeply marked in centre and clearer towards edge. *Growth on agar plate*: 1 (Mott) *Surface colonies* (forty-eight hours)—circular with slightly irregular edge, shiny, cloudy-white colour by reflected light, brownish by transmitted light; central nucleus marked and very dark, the rest of the colony having a dotted appearance, except extreme edge which is clear and transparent. *Deep colonies*—circular, even edge dotted all over, no clear edge, rarely lenticular. 2, 3, 4, 5, 6 and 7 as 1 (Mott), but no marked central spot. In a few days slight brownish tinge to naked eye. *Growth in litmus milk*: Strain 1 (twenty-four hours) acid, no clot; (six days) soft clot; (seven days) firm clot. Several other trials from cultures on different media gave similar results. Strain 2 (twenty-one hours) very faintly acid, no clot; (three days) alkaline; (four days) more alkaline. Strain 3 (twenty-one hours) very faintly acid, no clot; (four days) slightly alkaline; (six days) alkaline.

Micro-organisms	Character	Motility	Spores	Flagella	Broth		Dextrose broth		Lactose broth	Saccharose broth	Nitrate broth	H ₂ S	Lead broth	Peptone water	Litmus milk			Blood agar	Potato	Bile salt		Anaërobic in glucose formate broth	Glucose formate Gelatine shake
					Growth	Gas	Acid	Gas	Gas	Gas	Nitrites			Iudol	Acid	Alk.	Clot	Growth	Growth	Acid	Gas	Gas	Gas
P. dys. 1	Short rods	—	—	—	+	—	+	—	—	—	+	—	—	+	+	—	+	+	+	+	—	—	—
" 2	"	—	—	—	+	—	+	—	—	—	+	—	—	—	±	+	—	+	+	±	—	—	—
" 3	"	—	—	—	+	—	+	—	—	—	+	—	—	—	±	+	—	+	+	±	—	—	—
" 4	"	—	—	—	+	—	+	—	—	—	+	—	—	—	±	+	—	+	+	±	—	—	—
" 5	"	—	—	—	+	—	+	—	—	—	+	—	—	—	±	+	—	+	+	±	—	—	—
" 6	"	—	—	—	+	—	+	—	—	—	+	—	—	—	±	+	—	+	+	±	—	—	—
" 7	"	—	—	—	+	—	+	—	—	—	+	—	—	—	±	+	—	+	±	±	—	—	—
B. T. A.	More slender	+	—	8—16	+	—	+	—	—	—	+	+	+	—	±	—	—	+	—	±	—	—	—
B. C. C.	,	+	—	2—8	+	+	+	+	+	+	+	+	+	+	+	—	+	+	+	+	+	+	+

Strain 4 as 2. Strain 5 as 3. Strain 6 (twenty-four hours) slightly acid, no clot; (three days) faintly alkaline; (four days) alkaline. Strain 7 as 6.

The preceding table is a comparison of these strains, together with cultures of *B. typhi abdominalis* and *B. coli communis* from human sources.

The agglutination reactions of these seven strains of *B. dysenteriae* were tested, together with cultures of *B. typhi abdominalis* (B. T. A.), *B. enteritidis*, Gärtner (B. E. G.), *B. coli communis* (B. C. C.), isolated from human sources, and *B. coli communis* isolated from contaminated water.

Twenty-four hours old cultures of the bacilli in broth taken from two days old agar streaks off agar plates were employed for the purpose of these tests. Controls made at the same time gave negative results. The following method was adopted:—

Three dilutions of anti-dysenteric horse serum were prepared with normal saline solution to the strength of 20 per cent., 10 per cent. and 1 per cent. of the serum. One drop of the 20 per cent. dilution was then placed on a clean cover-slip by means of the sterile platinum loop, together with an equal-sized drop of the broth culture to be examined; these drops were immediately mixed, thus making a suspension of the bacilli in a 10 per cent. solution. The prepared cover-slip was then inverted on a hanging drop slide and examined microscopically immediately, after the lapse of half an hour, of one hour and one and a half hours. In a similar manner 5 per cent. and 0.5 per cent. suspensions were prepared.

The anti-dysenteric horse sera used for the above tests were of the following varieties: (a) Flexner (Harris type), (b) Shiga type, and (c) Flexner type.

In the following table minus (—) indicates negative reaction; plus-minus (\pm) indicates partial reaction, *e.g.*, a few small clumps, variable number of free and motile bacilli in the field; plus (+) indicates positive reaction, *e.g.*, bacilli aggregate into large and small clumps, practically no bacilli free in the field.

CONCLUSIONS DRAWN FROM ABOVE RESULTS.

(a) That the strains of *B. dysenteriae*, Nos. 2, 3, 4, 5, 6 and 7, belong to the same group, *viz.*, the coli group, and are, moreover, very closely allied, if not identical. I have not grown them upon mannite and galactose, so am unable to show possible differences

as described by Hiss (*Med. News*, February 14, 1903). (b) That strain No. 1 (Mott) is of the same group, but more nearly allied to the *B. coli communis*. It never failed to clot and acidify litmus milk, nor to produce indol; it always showed marked acidity, but never gas in bile salt solution. Whereas all the others slightly acidified litmus milk, which became alkaline again in from

Time of Observation			Immediate			$\frac{1}{2}$ hour			1 hour			$1\frac{1}{2}$ hours		
Percentage of dilutions			·5	5	10	·5	5	10	·5	5	10	·5	5	10
B. T. A.	..	..	A	—	—	—	±	±	±	±	±	±	±	±
			B	—	—	—	—	—	±	±	±	±	±	±
			C	—	—	—	—	±	±	±	±	—	±	±
B. C. C. (from human faeces),			A	—	—	—	—	±	±	—	±	—	±	±
			B	—	—	—	—	—	—	—	—	—	±	±
			C	—	—	—	—	—	—	—	—	—	±	±
B. E. G.	..	..	A	—	—	—	—	—	—	±	±	—	±	—
			B	—	—	—	—	—	—	—	—	—	—	±
			C	—	—	—	—	—	—	—	—	—	—	±
B. C. C. (from water)..			A	—	—	—	±	±	±	±	±	±	±	±
			B	—	—	—	—	±	±	±	±	±	±	±
			C	—	—	—	—	±	±	±	±	±	±	±
B. Dys. 1	..	..	A	—	—	—	±	±	±	±	±	±	±	±
			B	—	—	—	±	±	±	±	±	±	±	±
			C	—	—	—	±	±	±	±	±	±	±	±
B. Dys. 2	..	..	A	—	—	—	—	—	±	±	±	±	±	±
			B	—	—	—	—	—	±	±	±	±	±	±
			C	—	—	—	—	—	±	±	±	±	±	±
B. Dys. 3	..	..	A	—	—	—	—	±	±	±	±	+	+	+
			B	—	—	—	±	±	±	±	±	+	+	+
			C	—	—	—	—	±	±	±	±	—	±	±
B. Dys. 4	..	..	A	—	—	—	—	—	—	±	±	—	+	+
			B	—	—	—	—	—	—	±	±	±	±	±
			C	—	—	—	—	—	—	—	—	—	—	—
B. Dys. 5	..	..	A	—	—	—	—	—	±	—	—	—	—	+
			B	—	—	—	—	—	±	±	±	—	±	+
			C	—	—	—	—	—	—	—	±	—	—	±
B. Dys. 6	..	..	A	—	—	—	—	±	+	+	+	—	+	+
			B	—	—	—	—	±	±	±	±	±	±	±
			C	—	—	—	—	±	±	±	±	±	±	±
B. Dys. 7	..	..	A	—	—	—	±	±	+	+	+	+	+	+
			B	—	—	—	+	+	+	+	+	+	+	+
			C	—	—	—	—	—	—	±	±	±	+	+

four to six days, and at no time was the milk clotted, it never gave the indol reaction and only slightly acidified the bile salt solution. (c) That agglutination tests appear to be unsatisfactory for clinical purposes. The only satisfactory result is that of the Shiga antidysenteric serum, which agglutinated the Shiga bacillus in a dilution of 0·5 per cent. in half an hour. Taking all the three varieties of sera collectively, it will be seen

that none of the strains of *B. dysenteriae* gave a strong positive result, neither did the strains of *B. dysenteriae* taken collectively give a strong positive result with any one serum; the nearest approach to a uniform result being a 10 per cent. solution in one hour, which is too long a time and too low a dilution for clinical purposes; moreover, partial results are obtained with the same dilution and time when tested with other members of the coli group.

The materials for the bacteriological study of excreta in cases of asylum dysentery and colitis were obtained from eleven institutions in England by the following method: Faeces were taken in a sterile scoop with as little delay as possible and sent to the laboratory. (Case 6 was from scrapings of the bowel ulcerations taken in the *post-mortem* room.) Blood, used for agglutination reaction, was taken with aseptic precautions from the patient's ear or finger, or if *post-mortem*, from a large vein, into a sterile pipette which was then sealed. On arrival at the laboratory the following method was adopted for the bacteriological examination: Seven loopfuls of the material were put in a tube of broth and from this three broth tubes were inoculated, using respectively seven, seven and twelve loopfuls of the preceding tube. A large drop from the last three tubes was rapidly spread over the surface of three agar plates by means of a sterile brush. This brush was made of a piece of sheet rubber attached to a metal handle of thick wire. The drop was spread out into a thin layer by successive sweeps across the plate from one end to the other. By this means well-separated surface colonies were obtained. At the end of twenty-four hours' incubation at 37° C. all the colonies were ringed and different ones planted on to gelatine slopes. If any colonies appeared later on the original plates, subcultures from these were also made.

The gelatine slopes were incubated for twenty-four hours at 20° C., and when growth appeared it was examined. If it proved to be that of a motile bacillus, decolorised by Gram's method and not liquefying gelatine, it was then planted into litmus milk, glucose formate gelatine shake, and "MacConkey and Hill's" bile salt solution. In this manner the chief varieties of the coli group could be differentiated, viz., *B. coli communis*, *B. typhi abdominalis*, *B. enteritidis*, Gärtner, *B. lactis aërogenes* and *B. dysenteriae*. All other bacilli and cocci were planted into various media and their nature determined.

From these twenty-one cases, *B. coli communis* were present in every case. These micro-organisms did not differ materially from laboratory cultures of *B. coli communis*. Streptococci were not found in any, *B. pyocyaneus* in one, *B. acidilact.* in one, *B. proteus* in four, *B. aërogenes* in one, *B. enteritidis* of Gärtner in one, *Staph. pyog. aureus* in one, *Staph. pyog. albus* in two, *micrococcus tetragenus* in two, the *B. xerosis* in one, and an unidentified bacillus in one.*

The following is a table of the micro-organisms found :—

Case	Asylum	<i>B. Coli communis</i>	<i>B. Pyocyaneus</i>	<i>B. Acidilactici</i>	<i>B. Proteus</i>	<i>B. Lactis aërogenes</i>	<i>B. Enteritidis Gärtner</i>	<i>S. Pyogenes albus</i>	<i>S. Pyogenes aureus</i>	<i>Micrococcus tetragenus</i>	Other micro-organisms
E. T. ..	Colney Hatch	+	—	—	+	—	—	—	—	—	—
B. F. ..	Charing Cross	+	—	—	—	—	—	—	—	—	Yeasts.
W. W. ..	Charing Cross	+	—	—	—	—	—	—	—	—	—
E. S. ..	Claybury	+	—	—	—	—	—	—	—	—	—
F. G. ..	"	+	—	—	—	—	—	—	—	—	—
G. M. ..	"	+	+	—	—	—	—	—	—	—	Sarcinae.
C. H. ..	"	+	—	—	+	—	—	—	—	—	—
M. ..	"	+	—	—	—	—	—	—	—	—	—
J. H. ..	"	+	—	—	—	+	—	—	—	—	—
W. W. ..	Colchester	+	—	—	—	—	—	—	+	—	Sarcinae.
G. P. L.	Powick	+	—	—	—	—	—	+	—	—	—
G. B. ..	"	+	—	—	—	—	—	—	—	+	—
H. P. ..	Maidstone	+	—	—	—	—	—	—	—	—	—
H. P. ..	"	+	—	—	—	—	—	—	—	—	? See sub sequent remarks
(spleen pulp)											
S. D. ..	"	+	—	+	+	—	—	—	—	—	—
B. ..	"	+	—	—	—	—	—	—	—	+	—
L. G. ..	Bexley	+	—	—	—	—	—	+	—	—	—
W. W. B.	Hayward's Heath	+	—	—	—	—	—	—	—	—	<i>B. xerosis</i> (see note).
A. B. ..	West Riding, Yorks	+	—	—	+	—	—	—	—	—	—
A. T. ..	Banstead	+	—	—	—	—	+	—	—	—	—
J. C. ..	Preston	+	—	—	—	—	—	—	—	—	—
F. W. ..	"	+	—	—	—	—	—	—	—	—	Sarcinae

The spleen pulp of Case H. P., Maidstone, yielded a micro-organism which I have been unable to identify, and which presented the following characters :—

Character : Short rod, motile, no capsule. Stains well with

* As far as I am aware, this is the first time that the *B. xerosis* has been cultivated from the faeces of dysenteric patients.

aniline dyes, marked polar stain, and in some instances showed minute chromogen granules in the body of the bacillus. *Growth in broth*: Very slight flocculent precipitate. *In dextrose broth*: (Twenty-four hours) no apparent change; (forty-eight hours) slightly acid, good growth. *In lactose broth*: (Twenty-four hours) no apparent change; (twelve days) good growth, white deposit, some flocculi, white crust on surface. *In saccharose broth*: (Twenty-four hours) no apparent change; (twelve days) small white precipitate. *In nitrate broth*: (four days) no nitrites present. *In lead broth*: No H_2S formed. *As gelatine stab*: (Twenty-four hours) whitish growth along whole length of stab; (five days) general white cloud along whole length of stab with some yellowish dots towards the top, small extension of growth on surface. *As gelatine streak*: (Twenty-four hours) no apparent change; (forty-eight hours) slight whitish growth; (three days) increased growth, whitish, dry, firmly adherent to gelatine, no liquefaction. *In glucose formate gelatine shake*: no apparent change till (fourteen days) small white dots of colonies appeared, scattered throughout the gelatine. *As agar streak*: (Twenty-four hours) slight, moist, whitish growth; (forty-eight hours) more transparent, very dry. *In litmus milk*: (Twenty-four hours) no apparent change; (forty-eight hours) small flocculent curd, upper part clear and strongly alkaline. *On potato*: No growth. *Anaërobic in glucose formate broth*: No growth. *In bile salt solution*: No apparent change.

The serum of the blood sent me was tested for the presence of specific agglutinins against young broth cultures of *B. dysenteriae*, *B. coli* (from human sources), *B. enteritidis*, and *B. typhosus*. Controls made at the same time and under identical conditions gave negative results.

The dilutions, times of examination, and methods employed were similar to those previously described in this paper (*q.v.*).

The following table gives the results obtained, from which it will be seen that the serum of no single case gave good positive agglutinating reactions with any of the cultures used.

The conclusions drawn from the foregoing results are: (1) That if a specific organism does exist in these cases it is incapable of isolation on the ordinary media, possibly because it is rapidly outgrown by the *B. coli communis* and other intestinal saprophytes, or because it disappears after the early days of infection

Case	Asylum	Culture of micro-organ- ism used	AGGLUTINATION OF SERUM											
			Immediate			½ hour			1 hour			1½ hours		
			·5	5	10 %	·5	5	10 %	·5	5	10 %	·5	5	10 %
1. E. T. ..	{ Colney Hatch	B. dys. 1	—	—	—	—	—	—	—	—	—	—	—	—
		B. dys. 2	—	—	—	—	—	—	—	—	—	—	—	
		B. C. C.	—	—	—	—	—	—	—	—	—	—	—	
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	
2. B. F. ..	{ Charing Cross	B. dys. 1	—	—	—	—	—	—	—	—	—	—	—	
		B. dys. 2	—	—	—	—	—	—	—	—	—	—	—	
		B. C. C.	—	—	—	—	—	—	—	—	—	—	—	
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	
3. W. W. ..	{ Charing Cross	B. dys. 1	—	—	—	—	—	—	—	—	—	—	—	
		B. dys. 2	—	—	—	—	—	—	—	—	—	—	—	
		B. C. C.	—	—	—	—	—	—	—	—	—	—	—	
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	
4. E. S. ..	{ Claybury	B. dys. 1	—	—	—	—	—	—	—	—	—	—	—	
		B. dys. 2	—	—	—	—	—	—	—	—	—	—	—	
		B. C. C.	—	—	—	—	—	—	—	—	—	—	—	
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	
5. F. G. ..	{ Claybury	B. dys. 1	—	—	—	—	—	—	—	—	—	—	—	
		B. dys. 2	—	—	—	—	—	—	—	—	—	—	—	
		B. C. C.	—	—	—	—	—	—	—	—	—	—	—	
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	
6. G. M. ..	{ Claybury	B. dys. 1	—	—	—	—	—	—	—	—	—	—	—	
		B. dys. 2	—	—	—	—	—	—	—	—	—	—	—	
		B. C. C.	—	—	—	—	—	—	—	—	—	—	—	
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	
(From Case 1 to Case 6 the ± results were not recorded.)														
7. C. H. ..	{ Claybury	B. dys. 7	—	—	—	—	±	±	—	±	+	—	±	+
		B. C. C.	—	—	—	—	±	±	—	±	+	—	±	+
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	—
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	—
		B. dys. 7	—	—	—	—	—	—	—	—	—	—	—	—
8. M. ..	{ Claybury	B. C. C.	—	—	—	—	—	+	—	±	±	±	±	±
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	—
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	—
		B. dys. 7	—	—	—	—	—	—	—	—	—	—	—	—
		B. C. C.	—	—	—	—	±	±	—	±	±	—	±	±
9. J. H. ..	{ Claybury	B. E. G.	—	—	—	—	—	—	—	—	—	—	±	±
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	—
		B. dys. 7	—	—	—	—	—	—	—	—	—	—	—	—
		B. C. C.	—	—	—	—	—	—	—	—	—	—	—	—
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	—
10. W. W. ..	{ Colchester	B. T. A.	—	—	—	—	—	—	—	—	—	—	—	—
		B. dys. 7	—	—	—	—	—	—	—	—	—	—	—	—
		B. C. C.	—	—	±	—	±	±	—	±	±	—	±	±
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	—
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	—
13. H. P. ..	{ Maidstone	B. dys. 7	—	—	—	—	—	—	—	—	—	—	—	—
		B. C. C.	—	—	—	—	—	±	—	—	±	—	—	±
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	—
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	—
		B. dys. 7	—	—	—	—	—	—	—	—	—	—	—	—
14. S. D. ..	{ Maidstone	B. C. C.	—	—	—	—	—	—	—	—	—	—	—	—
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	—
		B. T. A.	—	—	—	—	—	—	—	—	±	—	—	±
		B. dys. 7	—	—	—	—	—	—	—	—	—	—	—	—
		B. C. C.	—	—	—	—	—	—	—	—	—	—	—	—
17. W. W. B	{ Hayward's Heath	B. E. G.	—	—	—	—	—	—	—	—	—	—	—	—
		B. T. A.	—	—	—	—	—	—	—	—	±	—	—	±
		B. dys. 7	—	—	—	—	—	—	—	—	—	—	—	—
		B. C. C.	—	—	—	—	—	—	—	—	—	—	—	—
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	—
21. F. W. ..	{ Preston	B. T. A.	—	—	—	—	—	±	—	—	±	—	—	±
		B. C. C.	—	—	—	—	—	—	—	—	—	—	—	—
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	—
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	—
		B. dys. 1	—	—	—	—	—	—	—	—	—	—	—	—
B. (Blood only sent)	{ Claybury	B. dys. 2	—	—	—	—	—	—	—	—	—	—	—	—
		B. C. C.	—	—	—	—	—	—	—	—	—	—	—	—
		B. E. G.	—	—	—	—	—	—	—	—	—	—	—	—
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	—
		B. T. A.	—	—	—	—	—	—	—	—	—	—	—	—

and is rapidly replaced by *B. coli* ; (2) that the ordinary typical *B. coli communis* is not the etiological factor in these diseases ; (3) that the *B. coli* isolated from these cases does not appear to differ to any marked extent from the typical colon organism ; (4) that the disease is not due primarily to *B. coli* and secondarily to pyogenic cocci.

In conclusion, I wish to express my thanks to Dr. Eyre, of Guy's Hospital, from whom I obtained the various strains of *B. dysenterix*, and who afforded me all the facilities of his laboratories during the course of these investigations ; also to those medical superintendents of asylums who so kindly supplied me with the necessary clinical material.

A COMPARATIVE STUDY OF SOME DYSENTERY BACILLI.

BY LIEUT.-COL. R. H. FIRTH.

Royal Army Medical Corps.

BEFORE discussing the main theme of this article, it may be convenient to review briefly modern views regarding the classification of dysentery. It is doubtful whether the literature of any disease is more encumbered with a mass of names, indicating the nature of the disorder or the author's conception of its pathology, than is that of dysentery. On this account it is probable that, under the term dysentery, there may have been included in the past, and even be still included, more than one pathological entity. Limiting our conception of the affection to that of a disease marked by frequent bloody and mucous stools, fever, tenesmus and abdominal pain in different degrees, coupled with thickening of the walls, hæmorrhages and ulceration of the mucous and submucous coats of the large intestine, notably of the cæcum and rectum, we find that the group of symptoms and lesions known as dysentery are conveniently classified into the following, namely: the endemic, the epidemic, and the sporadic classes.

For this division of the idiopathic dysenteries we are mainly indebted to Kartulis, who specially distinguishes the endemic or tropical form of dysentery by its climatic and geographical peculiarities and its pathological anatomy, claiming an amœba as its constant cause. With this general classification most authorities tacitly agree, subject, however, to the proviso that although an amœba may be the cause, at least, of an Egyptian endemic or tropical dysentery, yet the origin of epidemic dysenteries is essentially bacillary. As for the so-called sporadic forms, these are caused by chemical or mechanical means, or by the presence of parasites. A very superficial knowledge of the disease shows that the different forms of dysentery are clinically indistinguishable, since all have catarrhal, ulcerated and diphtheritic stages, accompanied by such symptoms as colic, tenesmus, slimy bloody stools, and later fever, rigors, loss of appetite and exhaustion. The so-called endemic dysentery has no tendency to spontaneous cure and is mainly chronic and

ulcerative, affecting the cæcum and ascending colon, while the epidemic type is of shorter duration, catarrhal and ulcerative, involving the whole colon and rectum. Whether we consider the disease from the clinical, etiological, or geographical point of view, it is clear that the pathological anatomy and its exciting cause constitute the real differences between the types or classes. Under these circumstances there appears to be no reason why we should not drop the terms endemic and epidemic, but adopt, as the basis of classification, the sole difference between the two types, namely, the presence of amœbæ or of apparently causative bacilli.

Whatever may be the pathological differences between amœbic and bacillary dysentery, they agree in their independence of dampness of soil or climate and of variations in temperature, also in their greater incidence in hot weather and under circumstances of poverty and bad or fouled water supply. Although it is not the purpose of this article to discuss the causative agent of amœbic or so-called endemic dysentery, it may be stated that Kartulis' case in support of his plea that amœbæ are the cause of all endemic dysenteries is a strong one, but until these amœbæ can be cultivated outside the body and then shown to be capable of causing a typical dysentery with amœbic stools in infected animals, the problem cannot be considered as solved absolutely. Leaving this aspect of the dysenteric question, we may now pass to a consideration of the various organisms which have been described as the cause of epidemic-non-amœbic or bacillary dysentery.

The presence of bacteria in the stools and tissues in epidemic dysentery has been known for some years, but the credit of first recognising a definite pathogenic bacillus in that disease rests with Chantemesse and Widal, who described its characters and its pathogenic action on animals. Certain researches by Kruse and Pasquale and by Celli and Fiocca, on the same lines, were to some extent confirmative. These latter investigators considered it highly probable that the disease was caused by a bacillus closely allied to the *B. coli*, which they had isolated from dysenteric cases. With cultures of this bacillus they claimed to produce dysentery in cats, and a toxin separated from growths of the organism was found to give rise to similar conditions. Identical results were obtained by del Pino and Aless-

andri, while Escherich also expressed his belief in the important part played by certain highly virulent bacilli allied to the coli group which he had isolated from a contagious enteric disorder in children whose morbid anatomy agreed closely with catarrhal dysentery. On the other hand, a causative rôle in the production of dysentery had also been ascribed to the pyogenic cocci, especially the streptococci, which are constantly found in association with the intestinal bacilli. The chief exponent of this view has been Zancarol, whose studies have been endorsed to some extent by those of Silvestri in Turin, and of Ascher who investigated cases of the kind in Prussia. The cocci isolated by Ascher were said to have shown the agglutination reaction with the blood serum of the patients from whom they were obtained. In the same way a variety of endemic dysentery prevailing in Cochin China was believed by Calmette to be due to the *B. pyocyaneus*, while the same micro-organism was isolated from a small epidemic of the disease occurring in America by Lartigau, and in Canada by Adami.

From the foregoing summary, it is clear that there has been no lack of variety in micro-organisms to which the causation of dysentery has been attributed. Much of the experimental work of these observers was carried out at a time and under conditions when bacteriological methods were more imperfect than they are now. For this reason too great importance must not be attached to their conclusions, particularly as subsequent researches have shown that the bacilli so far enumerated, except those of Chantemesse and Widal, possess doubtful specific properties. The investigations of an epidemic of dysentery in Japan during 1897, by Shiga, have yielded somewhat different and apparently more convincing results, inasmuch as he not only isolated a special bacillus from the stools of the affected, but showed its specificity by demonstrating the agglutination of its cultures by blood serum. It is true his experiments upon animals failed to reproduce the symptoms and intestinal lesions so characteristic of human dysentery; still, relying on the constant presence of the bacillus in the excreta of those suffering from dysentery, its absence from the discharges of other sick persons, and its agglutination by the serum of the affected, Shiga believed that he had isolated the probable cause of epidemic dysentery, or at least of that form

which prevails in Japan. Two years later, Kruse discovered an apparently identical bacillus in an epidemic of dysentery which prevailed in Rhenish Westphalia. At much the same time Flexner, in the Philippines, isolated from certain persons, suffering from dysentery, a bacillus presenting close resemblances to that obtained by Shiga in Japan. Flexner's work was practically confirmed soon after by Strong and Musgrave in their study of dysentery among the American troops in Manilla, while Drigalski, in an outbreak among the Prussian Guards encamped at Doberitz, Pfuhl, among men returned from the China expedition, and Müller, in an epidemic at Sudsteiermark, all describe an identical bacillus. Vedder and Duval recovered in several outbreaks of dysentery in the United States bacilli analogous to those isolated by Flexner in Manilla and Porto Rico; so, too, Rosenthal in Moscow reports to the same effect, while Rogers has found a bacillus closely resembling that described by Shiga in the stools of catarrhal dysentery in India. To the same effect are the observations of Park and Carey, made during an extensive outbreak in Tuckahoe, New York State. More recently Vaillard and Dopter give details of a micro-organism isolated by them in an epidemic of dysentery in the garrison of Vincennes, which they consider to be the same as that noted by the other observers. In short, from the most diverse parts of the globe has accumulated a considerable mass of evidence indicating that there exists an epidemic form of dysentery, characterised by a special micro-organism whose constant presence in the intestinal discharges and agglutination by the blood serum of those affected suggests its being considered as the probable cause of this disease.

The morphological and cultural characters of this micro-organism may be thus described. It is a short thin rod, varying from 1 to 3 μ in length and a trifle thicker than the *Bacillus typhosus*. Its ends are rounded, is non-motile, apparently without cilia, never forms spores, easily stains with the ordinary aniline dyes, but decolourises by Gram's method of staining. Bi-polar staining and the appearance of involution forms are not uncommon. It grows well at 37° C. on all the ordinary cultural media, but preferably in the presence of oxygen. Both as to motility and the presence of cilia some difference of opinion is evident in the literature concerning this bacillus.

As the result of a somewhat extended study of this micro-organism, derived from a variety of sources, I am unable to affirm that it is either motile or possessed of cilia.

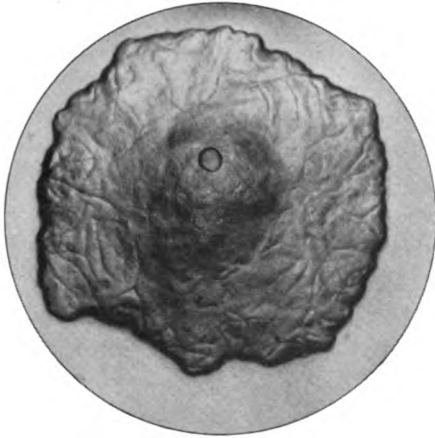
On a gelatine slope the bacillus of dysentery grows as a fine pearly pellicle with slightly serrated margins, not unlike that given by the *B. typhosus*. In plates made of this medium, the surface colonies are delicate pearl grey expansions, more or less translucent, with waved or indented margins and marked by delicate furrows and ridges suggestive of the finer venations on a vine leaf. The gelatine is not liquefied. In the accompanying Plate I. are shown typical colonies of some varieties of this bacillus. In all these features it presents many similarities to colonies of the enteric fever organism. It, however, grows a trifle more rapidly on gelatine than does this latter bacillus, but distinctly more slowly than does the *B. coli communis*. In fact, not only in its behaviour and mode of growth on gelatine, but also in other media, the dysentery micro-organism suggests an intermediate type between the enteric fever and the common colon bacillus. Its colonies in the gelatine depth present no distinctive characteristics.

Upon ordinary sloped agar the growth is moist, grey, slightly opalescent, and very much like that of the *B. typhosus*. If the agar be tinted with neutral red in the presence of either glucose or lactose, subsequent inoculation with the *B. dysenteriae* causes no change of colour.

In peptone broth the micro-organism causes a uniform turbidity, without the formation of any pellicle. After a few days, usually about the third day, a flocculent deposit forms and the reaction of the medium becomes slightly acid. The majority of the strains of this bacillus which I have examined fail to produce indol either in peptone bouillon or in peptone and salt solution. As will be seen from details to be given subsequently, there are some apparent exceptions to this rule. On the other hand, all varieties reduce nitrates. The growth on potato is somewhat variable, but in the majority of cases it is colourless, moist and glistening, while in some varieties it is of a pale yellow to a light brown colour.

In milk, the various dysentery bacilli grow well, producing no clot. The reaction of this medium does not sensibly alter for the first four days, but after that period there may be

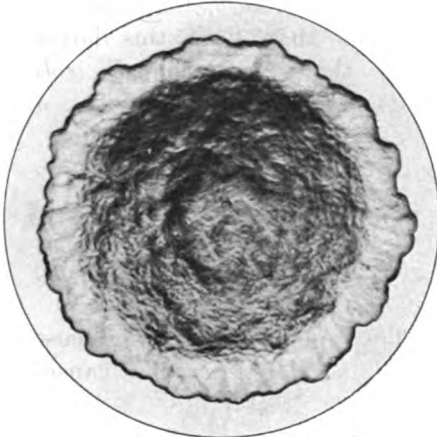
PLATE I.



Colony of B. Dysent. (Shiga III.).
72 hrs. × 30.



Colony of B. Dysent. (Flexner III.).
72 hrs. × 30.



Colony of B. Dysent. (Kruse II.).
72 hrs. × 30.



Colony of B. Dysent. (Vaillard).
72 hrs. × 30.



Colony of B. Dysent. (Cray).
72 hrs. × 30.



Colony of B. Dysent. (Bruce G.).
72 hrs. × 30.

Illustrating paper by Lieut.-Col. FIRTH.



some production of a faint acidity, but passing always to definite alkalinity about the eighth or tenth day.

When grown in the various sugars there is no production of gas by this bacillus, but all strains cause a small production of acid in glucose, and a few varieties give rise to acid production in mannite, maltose and galactose. Starch and glycerine are quite unaffected. Its behaviour in the media suggested by Proskauer and Capaldi is similar, on the whole, to that shown by the enteric bacillus. Practically all varieties fail to grow in No. 1 medium, while in No. 2 their growth results in either no change in reaction, or, at most, a faint acidity.

The accompanying table gives in some detail the chief cultural characteristics of the different strains of the dysentery bacillus which have been examined by me. Two of these were received from Dr. Flexner and are shown as Flexner I. and II.; Flexner III. came from Dr. Kral, of Prague, and Flexner IV. from Dr. MacConkey. Shiga I. came also from Dr. MacConkey, Shiga II. came from Dr. Kral, and Shiga III. from Dr. Bulloch. The varieties called Harris and Gray came through Dr. MacConkey, and were, I believe, originally obtained in Manila by Flexner; while Pickering and Landon were obtained by myself from the stools of two soldiers at Netley who had been invalided with dysentery from India and South Africa respectively. The Kruse I. came from Dr. Kral, and that marked II. from Dr. Flexner, while the variety marked Bruce G. was given me by Lieut.-Col. Bruce and obtained by him from a case of dysentery in South Africa. Col. Bruce made no claims for it being regarded as the causative agent of South African dysentery; it was the only strain surviving, on his return, of a number of micro-organisms which he isolated from dysentery cases, and is included in this comparative study as one of a series of closely allied bacteria intimately associated with that disease. The variety called Vaillard was sent to me by Dr. Vaillard, of Vincennes, having been isolated in the outbreak of dysentery in that garrison already referred to.

For the sake of brevity the letters N.G. are used to signify the fact of no gas production. Further, where a statement is made that a given percentage of acid was produced, the percentage is in terms of decinormal sulphuric acid, the degree of

CULTURAL CHARACTERISTICS OF SOME VARIETIES OF DYSENTERY BACILLI.

	FLEXNER I.	FLEXNER II.	FLEXNER III.	FLEXNER IV.	HARRIS.	GRAY.	PICKERING.	LANDON.	BRUCE, G.	SHIGA, I., II. & III.	KRUSE, I. & II.	VAILLARD.
Morphology	Small non-motile rod, often in pairs	Small non-motile rod, often in pairs	Small non-motile rod, often in pairs	Small non-motile rod, often in pairs	Small non-motile rod, often in pairs	Small non-motile rod, often in pairs	Small non-motile rod, often in pairs	Small non-motile rod, often in pairs	Small non-motile rod, often in pairs	Small non-motile rod, often in pairs	Small non-motile rod, often in pairs	Small non-motile rod, often in pairs
Flagella	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed
Gram's stain	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
Surface colonies on a gelatine plate	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied	Thin bluish film with irregular margin, surface of colony corrugated. Medium not liquefied
Gelatine slope	Delicate thin growth with dentated margin	Delicate thin growth with dentated margin	Delicate thin growth with dentated margin	Delicate thin growth with dentated margin	Delicate thin growth with dentated margin	Delicate thin growth with dentated margin	Delicate thin growth with dentated margin	Delicate thin growth with dentated margin	Delicate thin growth with dentated margin	Delicate thin growth with dentated margin	Delicate thin growth with dentated margin	Delicate thin growth with dentated margin
Agar slope	Moist grey growth	Moist grey growth	Moist grey growth	Moist grey growth	Moist grey growth	Moist grey growth	Moist grey growth	Moist grey growth	Moist grey growth	Moist grey growth	Moist grey growth	Moist grey growth
Broth	Diffuse growth no pellicle	Diffuse growth no pellicle	Diffuse growth no pellicle	Diffuse growth no pellicle	Diffuse growth no pellicle	Diffuse growth no pellicle	Diffuse growth no pellicle	Diffuse growth no pellicle	Diffuse growth no pellicle	Diffuse growth no pellicle	Diffuse growth no pellicle	Diffuse growth no pellicle
Milk at 37° C.	No clot	No clot	No clot	No clot	No clot	No clot	No clot	No clot	No clot	No clot	No clot	No clot
Peptone and salt solution	No indol	No indol	No indol	No indol	No indol	No indol	No indol	No indol	No indol	No indol	No indol	No indol
Potato at 37° C.	Colourless growth	Colourless growth	Colourless growth	Colourless growth	Colourless growth	Colourless growth	Colourless growth	Colourless growth	Colourless growth	Colourless growth	Colourless growth	Colourless growth
1% Glucose-peptone at 37° C.	N.G. Acid, 5%	N.G. Acid, 5%	N.G. Acid, 5%	N.G. Acid, 5%	N.G. Acid, 5%	N.G. Acid, 5%	N.G. Acid, 5%	N.G. Acid, 5%	N.G. Acid, 5%	N.G. Acid, 5%	N.G. Acid, 5%	N.G. Acid, 5%
1% Lactose-peptone at 37° C.	Unchanged Idem	Unchanged Idem	Unchanged Idem	Unchanged Idem	Unchanged Idem	Unchanged Idem	Unchanged Idem	Unchanged Idem	Unchanged Idem	Unchanged Idem	Unchanged Idem	Unchanged Idem
1% Saccharose-peptone at 37° C.	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem
1% Maltose-peptone at 37° C.	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem
1% Mannite-peptone at 37° C.	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem
1% Galactose-peptone at 37° C.	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem	Idem
Proskauer and Capaldi's Media (No. 1)	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth
Proskauer and Capaldi's Media (No. 2)	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth	No growth Acid growth
Nitrate broth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth
Neutralized glucose	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth
Anaerobiosis	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth	Reduces Unchanged Growth

acidity being in all cases estimated after twenty-four hours' incubation at 37° C., unless specifically stated as being otherwise. The Proskauer and Capaldi media reactions are twenty-four-hour statements after incubation at 37° C.; indol production, clotting of milk, reduction of nitrate broth and neutral red reactions were all noted at the end of seven days' incubation at 37° C.

An examination of the table shows that while all this group of micro-organisms have certain common characteristics in respect of morphology, growth on agar, gelatine, in broth, in milk, on potato, in nitrate broth, and in Proskauer and Capaldi's media, it is in their behaviour in the various sugars and in peptone and salt solution that certain points of difference show themselves. All of these organisms ferment glucose with the formation of acid, and all fail to ferment lactose and saccharose, but in respect of some of the other sugars and the production of indol in Dunham's solution, they practically divide themselves into those which ferment one or more of the three sugars, maltose, mannite and galactose, and those which do not, and those which produce indol and those which fail to do so. A further scrutiny of the reactions shows that ability or inability to ferment one or more of these three carbohydrates coincides broadly with an ability or inability to produce indol in a peptone solution. A still closer analysis of the reactions indicates that we have apparently two groups of micro-organisms: one represented by all the Shiga bacilli, both the Kruse strains, Flexner I. and III., Harris, Bruce and the Vaillard variety, all fermenting glucose only; and a second group, represented by the Flexner II. and IV., Gray, Pickering and Landon; these organisms split dextrose, maltose, mannite and galactose, with the production of acid. In the main these results in the sugars are in accord with the work of Drigalski, Lentz and some others who have examined dysentery micro-organisms, but there are certain discrepancies, and an explanation of these discrepant results may be found in the fact that several of those observers have failed to see that the medium to which they have added carbohydrate such as lactose, mannite, &c., is glucose free. Most of their work has been done with bouillon, and no mention is made of the removal of muscle sugar from the broth used. This is a most important precaution, and in

all my reactions care has been taken to see that there has been no trace of either glucose or muscle sugar.

As in the case of some other diseases, the blood serum of persons affected with dysentery appears to contain specific agglutinins, which are definitely active in respect of the infecting micro-organisms, and variably so in respect of other strains of apparently the same bacillus. This fact has naturally been taken to constitute an important argument in favour of the specific nature of the isolated micro-organism. Considerable time has been devoted to a study of the agglutination reactions of the bacilli actually isolated at Netley, as well as of those other cultures obtained from the various specified sources. The human blood serum was necessarily limited to that obtainable from the two cases which alone have come under observation, but in addition to these sera, some anti-colon serum was obtained from Dr. Dowson, of the Wellcome Research Laboratories, and various specific sera were obtained from rabbits inoculated with strains of the bacillus for the purpose. In all cases control observations were made with suspensions of *B. coli* and *B. typhosus*, also with an active anti-typhoid serum, while not infrequently normal human and rabbit's blood was used as a control for the specific sera. In none of these control tests was an agglutination reaction ever obtained. The reaction was in all cases observed microscopically in a hanging drop, the time limit being placed at one hour, and no agglutination accepted as being positive if the dilution was less than 1 in 20. The results obtained may be summarised in these terms.

The blood serum from both Pickering and Landon failed to agglutinate any strain of the bacillus, even failing in respect of the apparently specific organisms isolated from their respective dejecta. A rabbit inoculated repeatedly with small doses of Landon's bacillus gave a serum which agglutinated Landon 1 in 60, Flexner I. at 1 in 50, Shiga I. at 1 in 70. It failed to affect Pickering or Flexner II., or Harris and Gray. The other strains were not then available.

A rabbit inoculated with Flexner I. gave a serum which agglutinated Pickering 1 in 30, Landon and Kruse I. each at 1 in 50, Flexner I. at 1 in 80, but failed to touch Shiga I. or Kruse II. No other strains were available at this time.

A rabbit inoculated with Shiga I. was gradually worked up to agglutinate its own bacillus, and Flexner I. at 1 in 80, but had no effect on either Pickering, Landon or Flexner II. The action on Gray and Harris was doubtful even at 1 in 30.

A poly-valent anti-colon horse serum, obtained from Dr. Dowson, was efficient against Shiga I. at a dilution of 1 in 40, Flexner I. at 1 in 100, Flexner II. at 1 in 80, Gray, Harris and Landon at 1 in 60, Pickering and Bruce G. at 1 in 30. A second sample of anti-colon horse serum, kindly given me by Dr. Dowson, practically failed to touch any one of the various strains of dysentery bacilli.

The serum of a rabbit, as the result of inoculation with Shiga II., ultimately agglutinated its own bacillus at 1 in 110, Kruse I. and Shiga I. at 1 in 90, Flexner I. and III. at 1 in 60, Harris, Gray and Pickering at 1 in 40, but failed to act upon Landon, Flexner II. and IV.

A rabbit inoculated with Kruse I. gave a serum agglutinating that organism and Kruse II. at a dilution of 1 in 80, Flexner II. and III., also Harris, at 1 in 60, and Shiga I. at 1 in 40. It did not affect Flexner I., Pickering, Landon or Bruce G.

The serum from a rabbit as the result of inoculation with Kruse II. was only active against its own bacillus, Kruse I., all the Shigas and the Vaillard at 1 in 100. It was inactive against all the others.

The inoculation of a rabbit with Bruce G. gradually gave a serum active as to itself 1 in 100, Flexner II. and III. 1 in 40, but failed to touch either of the Shiga, the Kruse, Flexner I., or Pickering and Landon.

The serum from a rabbit which ultimately died from the effects of injections with Vaillard's bacillus agglutinated its own micro-organism at 1 in 40, Shiga II. and Kruse II. both at 1 in 50, and Flexner IV. and Gray at 1 in 30. It was not tried against the other strains. Another rabbit, which had been inoculated with certain soluble toxins (to be referred to later) derived from Shiga's bacillus, gave a serum agglutinating at 1 in 200 the Flexner, Kruse, Vaillard varieties, but affecting Shiga strains only at 1 in 80. It did not react on Bruce G.

These results leave little doubt as to the close identity of

the several bacilli with which the various observations have been made. At the same time it is clear that while the agglutinating properties of the bacilli from different dysenteric sources are very much the same, still there are differences in degree. Certain strains react better with a given serum than do others, especially if relatively high dilutions are used. Many of the sera were undoubtedly weak, and possibly this may explain why certain varieties of bacilli refused to react. The rabbit is not an ideal animal from which to obtain serum for this purpose, the goat and the horse being better; but the circumstances under which the inquiry had to be made did not permit of the use of these animals. Apart from this, the irregular agglutination phenomena noted as the result of attempts to obtain active sera after immunisation may be due to the formation of secondary agglutinins. Certain observations of Posselt and Segasser show that if one exhausts an agglutinating serum, by the addition to it of various micro-organisms, the absorption or fixing of agglutinins is not strictly specific, inasmuch as the immunising micro-organism absorbs not only the specific agglutinins, but also at times the secondary agglutinins or those specific to allied bacteria. At other times these secondary agglutinins may even increase instead of remaining stable or diminishing after the absorption of the specific agglutinins by the specific micro-organism. As explanatory of some of the difficulties surrounding the behaviour of dysenteric sera, Shiga has suggested the existence of certain hindering substances, or pro-agglutinoids, in an immunised serum which need to be fixed by the specific organism before the specific agglutinins can attach themselves.

Whatever may be the true explanation of the phenomena, an impartial review of this section of the inquiry clearly indicates that the formation of specific agglutinins, certainly in rabbits, as the result of gradual inoculations with dysenteric bacilli is both variable and feeble, and too much importance must not be placed upon either negative or positive agglutination reactions. Experience with the human subject accords with this view, as the specific agglutination reaction with the serum from persons suffering from dysentery can only be obtained usually within the first two weeks following the onset of acute symptoms, and even then is often slight. As will be seen

from what follows, there is much reason to believe that infection with bacilli of this group is not of the nature of a general septicæmia involving a constitutional reaction, but rather of the nature of a local cytolysis. If this be the case, then the absence of specific agglutinins from the general circulation is intelligible.

Whilst fully admitting the value of the constant presence of the bacillus in the stools of persons suffering from dysentery, and of the fact that it is usually agglutinated by the serum of the affected person, as evidence of its specific pathogenicity, still the crucial test depends upon the ability to produce the disease experimentally by means of pure cultures of the micro-organism. Until the publication of Vaillard's results at Vincennes the experimental facts have been somewhat ambiguous. As to the pathogenic effects of this bacillus upon man, the evidence is necessarily somewhat small, but even on this point it is not absolutely wanting. Strong reports the case of a Filipino prisoner, under sentence of death, who was induced to swallow a culture of the dysentery organism isolated in Manilla. The man suffered from the usual symptoms. The value of this case is somewhat lessened by the fact that dysentery was epidemic at the time. Shiga had one-twelfth of an agar culture, suspended in bouillon and killed by heat, injected into his own back. The immediate results of the injection were pain in the head, slight chill and fever. After six days, beyond the formation of a small abscess at the point of inoculation, the toxic symptoms passed off. Shiga's blood serum, however, showed active agglutination of the bacillus ten days after the injection. Flexner relates the experience of one of his laboratory assistants in Baltimore, who, while manipulating the bacillus from Manilla, accidentally aspirated a small quantity of fluid culture into his mouth. Notwithstanding immediate expectoration and free lavation of the mouth with a weak disinfectant, severe diarrhœa, with bloody and mucous stools, pain and tenesmus, developed within forty-eight hours.

On animals a considerable number of experiments have been made by numerous observers, but owing to the extreme susceptibility of all the ordinary animals to the toxins of the dysentery bacillus, lesions of the intestines analogous to those occurring in man, when suffering from the disease, have been

but rarely satisfactorily demonstrated. That they do result, however, has been successively maintained by Shiga, Flexner, Kruse, Vaillard and others, who report having caused marked enteritis, affecting chiefly the colon, in which the mucous membrane was oedematous, congested and beset with superficial necroses. The most emphatic lesions appear to have been produced in the dog, in the cat, in young pigs and rabbits. The horse reacts strongly to inoculations with the dysentery bacillus and not infrequently is killed by a small dose. The goat is more resistant, but rats, mice and guinea-pigs are quickly and easily affected, dying apparently from acute toxæmia. The channels of experimental infection have been various. Ingestion with food and by an œsophageal tube, even after preliminary neutralisation of the gastric contents or exhibition of an irritant, have not been successful, while even the direct introduction of pure cultures into the small intestine after laparotomy in a dog produced no appreciable effect. Intravenous injection of small quantities of a culture kills rabbits, dogs and small pigs in a few hours without allowing any definite lesion to be established. In large doses even subcutaneous injection is fatal to most animals, and in the rabbit, dog, cat and pig produces paralysis of the hind legs, with variable effects on the large intestine.

This aspect of the question has been the subject of considerable personal inquiry, and the following details furnish the results of my experiments as to bacillary dysentery in the rabbit. Various rabbits have not only been fed for days with cabbages soaked in fresh cultures of various strains of these dysentery bacilli, but also have had considerable quantities passed into their stomachs by means of an œsophageal tube, but in no cases have the ingestion of the bacilli given rise to any symptoms or signs of ill-health. Subcutaneous injections of emulsions in sterile water of twenty-four hours old living growths on agar slopes of various strains of these bacilli have given rise to variable effects according to the particular strain employed and the dosage. Injections of the whole of a twenty-four hours old agar slope culture, emulsified in sterile water, of the different strains of Flexner II. and IV., Pickering, Landon and Gray, while producing certain agglutination functions on the blood serum, practically gave rise to no intestinal disturb-

PLATE II.



Dysenteric ulcers in caecum of rabbit.



Dysenteric ulcers in large bowel of rabbit.



Illustrating paper by Lieut.-Col. FIRTH.

ance or lesion or any symptoms other than a temporary fall in temperature of about 1° , lasting for a couple of days. On the other hand, injections of the Shiga, Kruse, Vaillard, Harris, Flexner I. and III., and Bruce strains produced serious disturbance. In doses of a sixth to a fourth of a twenty-four hours' growth on an agar slope, of the first six strains there was merely a temporary fall in temperature, following an initial rise, but in larger doses, varying from one-third to three-fourths of an agar slope culture, according to the size and weight of the rabbit, after an initial rise in temperature there was a marked lowering of body heat, with paralysis of the hind legs, progressive enfeeblement, and death about the fourth or fifth day. At no time was there actual diarrhœa, but on *post-mortem* examination the small intestine was generally found to be filled with a glairy mucus and the mucous membrane somewhat œdematous or thickened. The large bowel was usually found to be tumefied or œdematous, with here and there congested or hæmorrhagic patches, while commonly in the cæcum necrotic patches, involving large areas of mucous membrane, leading to local sloughs and ulcers, were to be found. The photographs of some of these specimens are shown in Plate II. Sections made of the diseased patches of the intestinal wall showed an extensive bacterial invasion of the mucous layer, the bacilli being generally disseminated, but in places collected in clumps or masses. Cultures made from the heart's blood, spleen, kidneys, liver and mesenteric glands invariably gave negative results. Sections made of the liver, spleen and kidneys failed to show any bacilli in those viscera, but sections of mesenteric glands indicated in a few instances their invasion with bacilli.

The effects following the subcutaneous injection of the strain Bruce G. into a rabbit were slightly different from those caused by other varieties of this bacillus. Its action was slower, the animal on the seventh day being seized with a severe diarrhœa, passing liquid motions with mucus and slimy matter. An autopsy of the animal showed extensive enteritis involving the lower part of the small bowel, the cæcum and the upper part of the large intestine. No distinct ulcers were noted, at most some hæmorrhagic patches, but the whole mucous surface of the affected bowel was acutely inflamed as if by some violent irritant.

Cultures from the viscera and blood and sections of the affected parts were negative.

The intestinal lesions produced in the rabbit by subcutaneous injection of these dysentery bacilli bear a striking resemblance to those characteristic of the disease in man. The most remarkable fact is, however, the selective affinity which the micro-organism displays for a single viscera, viz., the cæcum and large intestine, directing upon their tissues all its effects, and apparently not touching any other organs. At the point of inoculation there results a temporary tumescence, and marked by a slight local development of the injected bacilli, but this is evidently but transitory, the micro-organisms either apparently getting into the blood-stream and quickly finding their way to the elective tissues where their toxic action rapidly produces necrotic effects; or undergoing bacteriolysis in the blood, their liberated toxins gradually exert a specific action on the intestinal mucous membrane.

The marked effects which result from the injection of living cultures of certain strains of these bacilli suggest the question, what results are produced by these bacilli (1) if killed by heat, (2) if killed by some chemical reagent, such as chloroform, and (3) do these bacilli secrete or contain a toxin affected by heat? These various points have been investigated with the following results:—

The dysentery bacilli are killed by an exposure to 60° C. for half an hour. Intravenous or hypodermic injections of emulsion of dead bacilli of the Kruse, Shiga, Vaillard and Flexner I. and III. strains, which had been killed by an exposure to this temperature, gave rise in rabbits to symptoms similar to those produced by the corresponding living cultures, the essential difference being that the fatal effect was somewhat delayed. If a culture of these bacilli on an agar slope be killed by exposure to chloroform vapour, and the dead bacilli be worked up into an emulsion in sterile salt solution, a fatal effect in rabbits, with intestinal lesions in the cæcum and large bowel, follows a subcutaneous injection in the back about the fourth day, marked also by hypothermia and paralysis of the hind legs.

The dysentery bacilli appear to secrete a soluble toxin, at least rabbits succumb to hypodermic injections of 5 cc. of the sterile filtrate from a four-day-old broth culture incubated at

37° C., obtained by filtration through a porcelain filter. The resulting symptoms during life and effects on the agglutinating powers of the blood serum are practically identical with those produced by injections of living bacilli, while the *post-mortem* appearances are mainly necrotic changes in the mucous membrane of the cæcum and large bowel. Fig. 1 shows a sloughing patch from the large bowel of a rabbit following a subcutaneous injection of 5 cc. of a sterile filtrate from a four-day-old broth culture of Shiga's bacillus. This toxic material, apparently secreted by the bacilli into broth in which they are growing, is no longer pathogenic to rabbits after an exposure to 65° C. for half an hour, but injections of this now no longer toxic material is still capable of setting up specific

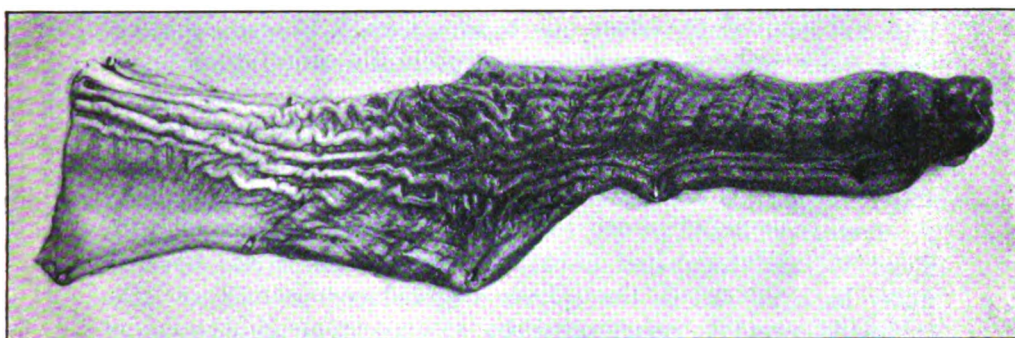


FIG. 1.—Piece of sloughing mucous membrane from large bowel of rabbit.

agglutination power in the blood serum, and also rendering the anima distinctly refractive to lethal doses of living dysentery bacilli. This suggests the existence of two bodies in this material, namely, a labile toxic and a stable functional substance.

A similar but more powerful toxic substance can be dissolved out of the dead bacilli by water. Following the lines suggested by the recent work of Conradi, Neisser and Shiga, six agar slope cultures of Vaillard's bacillus were incubated at 37° C. for twenty-four hours. These cultures were then killed by an exposure to chloroform, the dead bacilli were then scraped off

the agar and worked up into an emulsion with 50 cc. of sterile salt solution. This was allowed to autolyse for fourteen days at 37° C. The emulsion was then centrifuged and the supernatant clear liquid pipetted off and filtered through a porcelain filter. An intravenous injection of 1 cc. of this sterile liquid into a rabbit weighing 2.1 kilogrammes caused death in seventeen hours. A subcutaneous injection of 2 cc. into a rabbit of similar size caused hypothermia, paralysis of the hind legs, and some diarrhoea. On being killed, under chloroform, an examination of the body showed extensive ecchymoses and superficial necrosis of the mucous membrane of the cæcum. In fact, similar lesions to those caused by injections of the living bacilli and their toxins secreted into broth. Some of this aqueous extract of dead bacilli was heated to 65° C. for half an hour: its toxicity was not sensibly lessened when hypodermically injected into a rabbit. Exposure to 75° C. for half an hour rendered it no longer toxic. Similar observations were made with the toxins dissolved out of dead bacilli of the Shiga strains.

On analogous lines to some work done by Carega in respect of *B. coli*, the following observations were made as to the active substances contained in the bodies of one of these strains of dysentery bacilli; 500 cc. of broth were inoculated with Shiga II. and incubated at 37° C. for sixteen days. Over a water bath at 50° C. the culture was reduced to half and the contained proteids precipitated by the addition of 200 cc. of absolute alcohol. The precipitate was collected and digested in 50 cc. of 0.5 per cent. solution of caustic soda for twenty-four hours. After filtration the precipitate was dried at 40° C. This substance was set aside as being presumably a nuclein. The clear alkaline filtrate was then acidified with acetic acid, and the resulting precipitate, collected on a filter, was washed several times with very dilute acetic acid and finally dried at 40° C. This substance was deemed to be a nucleo-albumin. Of the nuclein there was 0.11 gramme and of the nucleo-albumin 0.08 gramme. The nuclein was rubbed up with sterile water and sterilised at 60° C. on three successive days; 0.005 gramme injected into the ear vein of a rabbit caused death within a quarter of an hour; given hypodermically, in a dose of 0.02 gramme, it caused at first some local irritation; on repeating

the dose every three days a cumulative toxic effect was produced, the animal dying after the third dose. No appreciable lesions were noticeable, nor was the blood rendered capable of agglutinating any dysentery bacilli. The toxicity of this nuclein was not sensibly diminished after half an hour's exposure to 65° C. The nucleo-albumin, on the other hand, had feeble toxic powers, though it was capable of establishing some specific agglutination reaction in the serum. This function was not absolutely nullified by an exposure to 65° C. for half an hour. There was no evidence of any immunising power. Taken in conjunction with the facts mentioned on page 451, these observations are not without interest.

Recognising the apparent elective affinity which the pathogenic strains of these bacilli have for certain parts of the intestinal tract, it appeared desirable to determine whether there was any evidence of the existence of neutralising substances for the toxins of these bacilli in any tissues of the rabbit's body. For this purpose, a healthy rabbit was selected and killed under chloroform. The spleen, some liver tissue, kidney, voluntary muscle, and portion of cæcum and large intestine were rapidly removed and placed in sterile normal salt solution at 37° C. The tissues were rapidly washed in the saline and two grammes each of spleen, liver, kidney and voluntary muscle rubbed up in a sterile mortar with an emulsion made from a twenty-four hour agar slope of Shiga's bacillus. The portion of bowel removed measured some ten inches in length: the mucous surface was carefully scraped with the back of a sterile knife, so as to practically remove all the mucous membrane. This emulsified material, measuring about 3 cc., was now rubbed up with an emulsion in saline solution made from the scraped surfaces of a twenty-four hour agar slope of Shiga's bacillus. All the mixtures were transferred to sterile test-tubes and incubated for two hours at 37° C. They were then centrifugalised and 5 cc. of each of the clear supernatant fluids injected subcutaneously into five rabbits, a sixth being taken for a control injection. The results were as follows: The control died on the third day, the liver, spleen, kidney and voluntary muscle animals all died on the fourth day, the symptoms and *post-mortem* appearances being similar to those already described. The animal which received the emulsion of bacilli and intestinal

mucous membrane survived till the seventh day, when owing to the onset of posterior paralysis it was killed. The *post-mortem* lesions were small hæmorrhagic necroses in the cæcum. A second experiment, on similar lines, indicated in even a more marked manner the antitoxic influences of the intestinal epithelia.

So far as it goes, this series of experiments clearly suggests the existence of some fixing or neutralising substance in the epithelia of the intestinal tract of the rabbit. That such is probably the case is supported by the difficulty to secure infection by ordinary feeding with dysentery bacilli and by the following observations. Laparotomy was performed on two rabbits; into the cæcum of one was injected by means of a fine needle an emulsion, made in sterile water, of two twenty-four-hour-old agar slopes of Vaillard's bacillus, while into the bowel of the other 20 cc. of freshly filtered broth from a four-day-old bouillon culture of Shiga's bacillus were injected. In neither case was there the slightest evidence of discomfort or illness. A week later, on the rabbit which had received the soluble toxins a second laparotomy was performed, and an emulsion of living bacilli from two twenty-four-hour-old agar slopes of the same strain injected into the cæcum. At the end of a fortnight the animals were killed; the intestinal mucous membrane in both was quite normal. It will be remembered that smaller doses of the same culture and filtrate when given subcutaneously were markedly pathogenic.

Arising, naturally, from these experimental observations as to the specific action of these bacilli is the question of securing immunity from their effects. My own experiments relating to this topic have been few and the results are too indefinite to justify extended notice. They are, however, sufficiently encouraging to warrant further work, which necessarily will furnish the subject of a future communication. The same question has been approached by other workers, notably by Shiga and Gay. The former has produced a serum by immunising goats with cultures killed by heat which he reports to be both protective and curative. He employed it in an extensive epidemic in Japan, with a death-rate of 9·6 per cent., while the mortality during the same period in the same epidemic under ordinary treatment was 34·7 per cent. Gay's work has

been purely an experimental study on guinea-pigs, immunised with dead cultures against lethal doses of the living bacilli, and also covers inquiries as to the protective power of immunised horse serum on the same animals against living cultures of *B. dysenteriae*. He finds that a vaccine made from dead bacilli is sufficient to protect guinea-pigs from a succeeding multiple fatal dose of living dysentery bacilli, and to produce in the horse an active immune serum. This immune serum of the horse exhibits marked protective properties on guinea-pigs against fatal infection with *B. dysenteriae* or its toxin. A useful serum therapy of bacillary dysentery is, therefore, rendered highly promising.

Further important points in relation to this group of micro-organisms are, what is their ability to survive outside the human body, and what technique is best adapted for their isolation. In respect of their viability, certain personal observations indicate that when dried on pieces of rag or placed in dry soil the dysentery bacillus will remain alive from twelve to twenty-two days, according to the temperature, the former figure being obtained when the room temperature was 12° C., and the latter when it was 28° to 35° C. When placed in ordinary tap-water it is recoverable up to twenty-five days at 22° C., but if the water be kept in the incubator at 37° C. it was recoverable on the thirty-sixth day. From sterile water stored at room temperature of 14° C. it was recoverable up to forty-three days. When spread on breadcrumbs it survived six days. The isolation of dysentery bacilli in the early stages of a case is by no means difficult, but quite otherwise when the acute symptoms pass off. Probably the best technique to adopt is to inoculate one or more broth tubes, or tubes containing sterile water, with loopfuls from the mucus which is so characteristic of dysenteric excreta. It is futile dipping the needle or loop into the faeculent mass. After inoculation incubate for twelve hours at 37° C., and then from these tubes streak, with concentric rings, the surfaces of a series of neutral litmus lactose agar plates as already explained on page 398 of this Journal, using one needleful for streaking at least three plates before reinoculating. Owing to the dysentery bacilli having no effect on lactose their resulting colonies will appear as translucent glistening blue points, while all the colonies

of colon bacilli and others which produce acid on this sugar will be red. The absolute recognition of the identity of the isolated micro-organisms, in the absence of an active specific serum, is dependent upon careful subculturing, in accordance with details already discussed.

In attempting to summarise this somewhat imperfect study, it seems permissible to draw the following conclusions:—

(1) That the various strains of Shiga, Kruse, Vaillard, Harris, and Flexner I. and III. are practically identical. Bruce G. resembles them closely culturally, but produces perhaps less alkali in milk, and also gives colonies in gelatine which are more plicated than the others. It also fails to respond definitely in agglutination reactions to sera which are active to other strains. Pathologically its action is slightly different, at least in the rabbit. Too much importance must not be attached to these differential features, as the culture of the micro-organism in question was nearly dead when brought to this country, and had to be reactivated by a succession of sub-cultures. The other strains, Flexner II. and IV., Gray, Pickering and Landon, are the same, but apparently non-pathogenic to rabbits. These latter varieties present some cultural differences in the sugars from the other strains examined.

(2) That in the intestinal dejecta of acute dysentery cases bacilli can be found which have certain characteristics differentiating them from the common colon bacilli and the micro-organism of enteric fever. These bacilli are agglutinated only by the blood of men or animals either suffering from epidemic dysentery, or infected by them and their elaborated toxic substances.

(3) By the subcutaneous inoculation of some of these bacilli, or of their contained and excreted toxic substances, one can produce in rabbits symptoms and intestinal lesions characteristic of epidemic dysentery in man.

(4) The toxic substances elaborated by or contained in the bodies of these bacilli have a selective affinity for the mucous membrane of the cæcum and large bowel. But owing to the apparently high refractiveness of the epithelial lining of the intestinal tract of rabbits to these bacilli and their toxins, the production of intestinal lesions or general infection by them in these animals is not possible either by ordinary methods

of ingestion or direct introduction into the various parts of their alimentary canal.

(5) That the excreta of dysentery cases contain not only pathogenic bacilli of definite cultural characters, but also others which, apparently, are not pathogenic, though presenting certain superficial cultural resemblances. So far as this present inquiry goes, the distinctive feature of the non-pathogenic group seems to be an ability to split maltose, mannite and galactose, to the formation of acid, but without production of gas, also to produce indol, characteristics which are wanting in the pathogenic varieties. These non-pathogenic forms are probably the "pseudo-dysentery bacilli" of some authors, but whether they represent degraded or transitional forms of the pathogenic type we are not in a position to say.

(6) The clinical entities produced by the pathogenic dysentery bacilli probably represent a group rather than a single class of cases. The cases may range from the typical acute dysentery of camps, through the various degrees of ileo-colitis, to the infective diarrhœas of infants and adults. The causative agent in these cases is probably a micro-organism corresponding to one or other of the pathogenic types described in this article. Although there is much to warrant a belief that an acquired immunity may be secured against individual varieties of dysentery bacilli, the mere fact of there being a possible plurality of varieties of these bacilli, capable of causing a train of clinical symptoms common to them all, suggests great difficulties in the way of producing a condition of general immunity against infection by the whole group.

In concluding this article, I desire to thank my colleague, Captain Fowler, for much aid in the various cultural manipulations and autopsies of animals examined, also Major Leishman and Captain D. Harvey for kindly preparing and cutting sections. As a considerable number of references have been made to the literature of this subject, already of some extent, a short bibliography is appended which may be of use to others wishing to look up the papers in their original form.

BIBLIOGRAPHY.

- CHANTEMESSE and WIDAL. *Bulletin de l'Acad. de Med.*, Paris, 1888.
KRUSE and PASQUALE. *Zeitsch. f. Hyg.*, 1894.
CELLI and FIOCCA. *Ann. dell' Institut d' Igiene Speriment. di Roma*, 1895.

458 *A Comparative Study of some Dysentery Bacilli*

- ESCHERICH. *Centr. f. Bakt.*, 1899, Bd. xxvi., p. 385.
 ZANCAROL. *Dysenterie tropicale*, Paris, 1895.
 SHIGA. *Centr. f. Bakt.*, 1898, Bd. xxiii., p. 599, also 1899, Bd. xxiv., pp. 817, 870 and 913; *Zeitsch. f. Hyg.*, 1902, Bd. xli., Hft. 2, p. 353.
 KRUSE. *Deutsche Med. Woch.*, 1900, Bd. xxvi., p. 637, also 1901, Bd. xxvii., pp. 370 and 386.
 FLEXNER. *Bull. Johns Hopkins Hosp.*, 1900, xi., pp. 39 and 231; also *Centr. f. Bakt.*, 1900, Bd. xxviii., p. 625, also 1901, Bd. xxx., p. 449; also *Phil. Med. Journ.*, 1900, p. 414; also *Univ. Pennsylv. Med. Bull.*, 1901, xiv., p. 190.
 STRONG. *Report Surg.-General U.S. Army*, Washington, 1900.
 DRIGALSKI. *Veröffentlichungen aus dem Gebiete des Militär Sanitäts Wesens*, 1902.
 PFUHL. *Idem.*
 MÜLLER. *Centr. f. Bakt.*, 1902, Bd. xxxi., p. 558.
 VEDDER and DUVAL. *Journ. Exp. Med.*, 1902, vi., p. 181.
 ROSENTHAL. *Deutsche Med. Woch.*, 1903, No. 6, p. 97.
 ROGERS. *Journ. Trop. Med.*, February, 1903.
 PARK and CAREY. *Journ. Med. Research*, 1903, ix., p. 180.
 VAILLARD. *Ann. de l'Institut Pasteur*, 1903, xvii., p. 463.
 CONRADI. *Deutsche Med. Woch.*, 1903, No. 2, p. 26.
 DUVAL and BASSETT. *Centr. f. Bakt.*, 1903, xxxiii., No. 1, p. 52.
 PARK. *Proc. N.Y. Path. Soc.*, 1903, p. 182.
 DOMBROWSKI. *Arch. f. Hyg.*, xlvii., 1903, fasc. 3, p. 243.
 BRIEGER and MAYER. *Deutsche Med. Woch.*, 1903, No. 18, p. 309.
 NEISSER and SHIGA. *Deutsche Med. Woch.*, 1903, No. 4, p. 61.
 CAREGA. *Centr. f. Bakt.* xxxiv., No. 4, p. 823.
 POSSELT and SAGASSER. *Wien. Klin. Woch.*, 1903, No. 24, p. 691.
 LENTZ. *Zeit. f. Hyg.*, 1902, xli., Hft. 3, p. 559.
 HISS and RUSSELL. *Med. News*, 1903, February 14, p. 289.

THE GERMAN REGULATIONS FOR UTILISING VOLUNTARY AID IN WAR.

BY LIEUT.-COL. W. G. MACPHERSON, C.M.G.
Royal Army Medical Corps.

THE meaning and scope of voluntary aid organisation not only among the German people but amongst all the great Continental Powers, are not well understood in this country. We have been slow to grasp its importance, or, at any rate, to take active steps to apply a similar organisation to our own needs in war; mainly, I think, because of the essential difference between the military systems of Continental nations and our own; the difference, that is to say, which is bound to exist between a country whose whole people has a direct interest in its military life, and one whose military life is known only to a fraction of its population. My object, therefore, in drawing attention to the German regulations on the utilisation of voluntary aid in war is to present, through them, the exact position which those who are anxious to help the Army Medical Service in its care of the sick and wounded should be prepared to accept in war, and should provide for by local or other organisation in time of peace. The regulations in question form the sixth part of the *Kriegs-Sanitäts-Ordnung*, and received the Imperial sanction on December 18, 1902, being published for general information during the current year. They are headed "*Freiwillige Krankenpflege*," and consist of twenty sub-headings, each containing from one to fourteen paragraphs, and six appendices. In 1901 our Director-General of Military Intelligence published a pamphlet on the subject of the organisation of voluntary medical aid in war in Austria, France and Germany, which included a translation of the "Service Instructions," then in force in Germany, for ensuring the co-operation of voluntary aid with the Army Medical Service. This translation contains more elaborate details than the new regulations, but it may not be out of place to offer the following notes, embodying the main facts in the order in which they are now presented in the sixth part of the *Kriegs-Sanitäts-Ordnung*.

GENERAL REGULATIONS.

The general regulations commence with a definition of "*Freiwillige Krankenpflege*," which may be translated shortly as "Voluntary Aid." For military purposes this is regarded as including all voluntary arrangements for supplementing the Army Medical Service in war, and all persons who take part in these arrangements. It is specially stipulated that the military authorities do not contemplate accepting such aid in connection with the Army Medical Service in time of peace, and that the aid which will be accepted in war is limited to that organised by: (1) The German Red Cross Territorial Societies; (2) societies associated with them; (3) the St. John, St. George, and Maltese Orders of Knighthood.

The limitation is made in favour of these bodies because it is understood that they already devote themselves in peace and within the German Empire to the care of the sick and wounded. Under exceptional circumstances permission may be given to others to take part in voluntary aid. Application for such permission has to be made through a high official known as the Imperial Commissioner and Military Inspector of Voluntary Aid, and in the event of approval by the War Office, the society or individuals concerned will be attached to one of the recognised Red Cross Territorial Societies, or to one of the Orders of Knighthood. Voluntary aid from foreign countries may be accepted under the same conditions, but its sphere of action will be confined to the home territory. Finally, it is stipulated that voluntary aid will not be permitted to form any independent unit, and its co-operation with the official units will only be permitted in so far as it can be dove-tailed into the official organisation, and placed under official control. Otherwise, the regulations state, it will not further but only hamper the administration of the services in aid of the sick and wounded. It must, therefore, submit itself unconditionally to the orders of the military authority and individual representatives of that authority.

GENERAL SCOPE OF VOLUNTARY AID WORK.

In supplementing the regular Army Medical Service, voluntary Aid will be confined to the following spheres of activity: (a) The nursing of sick and wounded; (b) the transport of sick

and wounded ; (c) *depôt* duties, *i.e.*, in stores. All this supplementary help must be given in rear of the fighting force, either in the home territory or on the lines of communication. The employment of voluntary aid with the first line will only be permitted in special emergencies, and with the approval of the Commander-in-Chief. In such emergencies the Voluntary Aid *personnel* must be attached to a bearer company or field hospital belonging to the regular Army Medical Service, and be placed under its commanding officer. The establishment of hospitals of the Red Cross Societies in the area of field operations may be permitted under the special authority of the Inspector-General of the lines of communication and railways, but this permission will only be granted in case of urgent necessity and on the understanding that the hospital will be withdrawn whenever the necessity disappears.

The following is the detailed work which the regulations lay down as forming the general duties of Voluntary Aid Societies : (1) The organisation of male and female nurses and cooks for duty in military reserve hospitals on the lines of communication and stationary field hospitals. A proportion of the male nurses must be trained as stretcher bearers. (2) Similar organisation of male and female nurses for duty in connection with the conveyance of sick and wounded from the lines of communication to the reserve hospitals, and also of stretcher bearers in the same sphere. (3) Appointment of individuals trained in merchants' or forwarding agents' offices, for the management of Voluntary Aid *depôts*. (4) Collecting and forwarding gifts. (5) Supplementing the military reserve hospitals, either by taking over special branches of hospital management, such as the dieting, laundry work, &c., or by supplying certain portions of equipment, such as beds, linen, clothing, kitchen and messing utensils, &c., or by the establishment of special Red Cross Society hospitals, or finally by the reception of convalescents into private nursing homes. (6) Supplying information to the relatives regarding the sick and wounded in hospitals, and sharing generally in the duties of the official Central Information Bureau. (7) The establishment of dressing and rest stations at those places along the line of railway where no special provision is made by the regular service. This can only be done with the concurrence of the military director of

railways, the committee for sick transport, and the officer commanding the lines of communication. (8) The preparation and equipment of hospital trains out of the Society's own funds and under its own management and direction. This, however, will only be permitted when the military authorities consider it necessary. The conditions laid down with regard to the hospital trains of the regular Army Medical Service and the specifications for their construction will be made applicable to these Red Cross trains.

The sub-section closes with the stipulation that the work of Voluntary Aid Societies in peace, in preparing for these duties in time of war, must be specially directed towards ensuring rapid mobilisation on the outbreak of war.

THE IMPERIAL COMMISSIONER AND MILITARY INSPECTOR OF VOLUNTARY AID.

At the head of all Voluntary Aid there is an Imperial Commissioner with the official title of "Imperial Commissioner and Military Inspector of Voluntary Aid." The appointment is one which is held during peace as well as war. The officer holding it is appointed by the Emperor. He has under him two assistant Commissioners, who carry on official business when he is prevented from doing so himself. These assistant Commissioners are also appointed by the Emperor on the proposal of the Imperial Commissioner with the approval of the War Office. It is enjoined in the regulations that all government officials shall give the Imperial Commissioner whatever information he may require to enable him to carry on his duties, and that he shall be granted any assistance which is permissible in accordance with existing orders. His office during peace is in Berlin. During war one of the Assistant Commissioners takes it over from him.

In addition to the help he receives in accordance with the above arrangements he is advised by two special Committees, viz., (1) a standing committee, composed of the Chairman of the Central Committee of German Red Cross Societies, the two Assistant Commissioners, and two representatives of the War Office. The latter are appointed with a view to facilitating communications between the Commissioner and the War Office, and supporting him generally in his duties. (2) A higher

Advisory Board, which is only to be summoned on specially important occasions.

The Imperial Commissioner nominates the members of the Committee and the Advisory Board, and he also acts as Convener. The German Red Cross Societies and Societies associated with them are generally under the direction of the Central Committee of the German Red Cross Societies, which has its seat in Berlin; while the Orders of Knighthood are under the direction of their respective Councils. But both the Central Red Cross Committee and the Councils of the Orders are subordinate to the Imperial Commissioner on all occasions on which they come into association with the army and official administration.

DUTIES OF THE IMPERIAL COMMISSIONER.

The Imperial Commissioner supervises during peace the training of the *personnel* of Voluntary Aid Associations, and the preparations made by them for war. He is obliged to forward to the War Office annually a report upon the state of all *personnel* and material that come under the heading of Voluntary Aid; and the War Office informs him in return what preparations should be made on the part of the Voluntary Aid Associations in the event of mobilisation. He distributes the work required by the War Office amongst the recognised Red Cross Societies and Orders of Knighthood; and the War Office has the power to satisfy itself, by inspection, that the preparations which are being made meet its requirements. It is his duty to select and submit to the War Office for approval the names of individuals who are suitable for appointment as Voluntary Aid Delegates in the event of mobilisation. The functions of these Delegates are detailed in the next sub-section. It is also his duty: (a) To make himself acquainted with the objects and regulations of all associations that may be formed voluntarily for the purpose of supplementing the Army Medical Service in war, and his approval must be obtained before such associations can be included amongst or attached to the Red Cross Societies; (b) to take into consideration the wishes of individual associations regarding the work they are to undertake; (c) to concentrate as much as possible the work of separate societies and individuals; (d) to

keep the various associations informed of the lines on which they may work to the best advantage.

When war breaks out the Imperial Commissioner hands over his office at Berlin to one of the Assistant Commissioners and joins the Headquarter Staff of the Commander-in-Chief in the field, where he directs Voluntary Aid in association with the Inspector-General of the Lines of Communication and Railways and the Principal Medical Officer of the Field Force. While occupying this position it is his duty to issue the papers authorising Voluntary Aid Delegates to act, as well as Red Cross brassards, and identification cards to all individuals connected with Voluntary Aid. It is enjoined that these badges, namely, the white brassard with the Red Cross, must be clearly stamped with his stamp, and that the bearers must carry identification cards authorising them to be in possession of the brassard.

Should any persons connected with Voluntary Aid be called upon to perform duties requiring their presence in districts where the right to travel without restriction has been withdrawn, it is the duty of the Imperial Commissioner to give them written permits, stating their errand and the locality to which they are going. These permits must also be endorsed with the approval of the Commander-in-Chief of the Army. They may be issued also by the Voluntary Aid Delegates appointed to the staff of the Inspector-General of Communications. The Imperial Commissioner must keep himself in close touch with the Assistant Commissioner who has taken over his office in Berlin. This official is obliged to carry out all the orders and requirements of the Commissioner as regards Voluntary Aid with the field force. He is in direct communication with the War Office and submits his proposals according to the instructions received from the Imperial Commissioner. He is assisted by a Board consisting of: (1) The President of the Central Committee of the Prussian Red Cross Society and four to six of its members; (2) the same number of members belonging to the other Red Cross Societies; (3) representatives of the Orders of Knighthood; (4) other individuals especially qualified to help him in the despatch of business. The duty of managing the depôt and accounts at Berlin is placed in the hands of the President of the Central

Committee of the Prussian Red Cross Society. But in the event of his being selected for the appointment of Assistant Commissioner, this duty will be handed over to one of the other members of the Central Committee with the approval of the Imperial Commissioner.

VOLUNTARY AID DELEGATES.

Voluntary Aid Delegates are appointed in civil and military districts throughout Germany to enable the Imperial Commissioner or his Assistant to communicate through them with the military and Government officials, and for the purpose of supervising Voluntary Aid schemes within their districts. They are selected by the Imperial Commissioner on the approval of the local Red Cross Societies or Orders of Knighthood. Before they can carry on any duties on mobilisation the appointments must be sanctioned by the War Office, and only those individuals who have been so proposed, appointed and sanctioned may assume the title of "Voluntary Aid Delegate." Some slight modification in the manner of appointing delegates is made in connection with Bavaria, but the principle is the same. Each delegate on accepting appointment must be prepared to serve for a fixed period, either with the army in the field or with the home garrison. He must make a declaration of the time he is prepared to serve, and, as a rule, must bind himself for a period of at least three months, if he selects employment with the army in the field, or for the duration of the campaign, if with the home garrison. The Imperial Commissioner has power to revoke any appointment, and no Delegate can resign without his consent. He has also power to grant temporary leave of absence, release from duty before the specified period has expired, or removal on medical or other grounds. He must also arrange for legal compensation, where such is involved.

The office of Voluntary Aid Delegate is honorary, but clerical assistance is given. All Delegates who are not entitled to wear a military uniform or field uniform as members of an Order of Knighthood must wear a specified uniform, the details of which are given in one of the appendices. They must wear the Red Cross brassard at all times, and have in their possession the identification card entitling them to wear the brassard,

as well as their authority to act as Voluntary Aid Delegates. They are given a service seal or stamp.

THE DUTIES OF VOLUNTARY AID DELEGATES IN PEACE.

In peace the Voluntary Aid Delegates are divided into two distinct classes, the so-called Territorial Delegates, and the Delegates of Army Corps districts.

(a) *Territorial Delegates.*—Each province of Prussia and each separate state of the German Union has a Territorial Delegate during peace. He is the direct channel of communication between the Imperial Commissioner and the Voluntary Aid Societies, &c., in his district. In order to ensure continuity of work the Territorial Delegates have to organise their own business arrangements themselves, and appoint substitutes to act for them in the case of absence or other circumstances. They are obliged to carry out the orders of the Imperial Commissioner, and remain constantly in touch with the national and provincial Red Cross Societies, and Orders of Knighthood in their districts. They direct and supervise the work of these so far as preparation for war is concerned, and act as advisers to societies and individuals with regard to the lines on which they should work. In the event of any new society being formed in their districts, they will make themselves acquainted with its aims and objects and take the necessary steps to bring it into association with the general scheme of organisation of Voluntary Aid.

With regard to the general work of preparation for mobilisation in their districts, they receive instructions from the Imperial Commissioner and forward to him annually the following documents: (1) A list of individuals fitted and willing to take up the position of Voluntary Aid Delegate in war. The names of these are submitted to the Delegates by the Red Cross Societies and Orders of Knighthood in each Province or State. (2) A general review of the existing state of Voluntary Aid work in their districts, along with a general plan for the employment of the Voluntary Aid *personnel* in war, including doctors, dispensers, male and female nurses, stretcher bearers, male and female cooks, &c. (3) A general review of Voluntary Aid material, *e.g.*, Red Cross hospitals, stores, utensils, linen, &c. (4) Nominal rolls of *personnel*, who are ready for immediate

distribution on the outbreak of hostilities to hospitals, convoy and transport work and depôts.

(b) *Army Corps District Delegates*.—Army Corps districts in Germany may extend over several States or Provinces, and at the headquarters of each Army Corps a Voluntary Aid Delegate is appointed to act as the channel of communication between the Territorial Delegates and the General commanding the Army Corps. Their chief function, therefore, is to keep themselves at all times in touch with the General and his Staff, and to endeavour to carry out the arrangements which the latter may make for the utilisation of Voluntary Aid within the Corps district. It will be their duty to let their Territorial Delegates concerned know of these arrangements and keep the General informed as to the manner in which they are being executed. They act, in fact, as intermediaries between the military authorities and Voluntary Aid, are representatives of both sides, and carry out the commissions of both, assisting the Territorial Delegates, at the same time, in the preparation that is required by the War Office in connection with an army in the field. A Territorial Delegate of a locality which happens to be the headquarters of an Army Corps may act as an Army Corps District Delegate.

THE DUTIES OF VOLUNTARY AID DELEGATES IN WAR.

The duties of Voluntary Aid Delegates in war depend upon whether they are employed with the army in the field or with the army occupying the garrisons in the home territory. In either case their work must be carried out in direct association with the administrative officers of the Army Medical Service, with whom rest all decisions on questions concerning the needs of the sick and wounded, and on all technical matters.

(a) *Voluntary Aid Delegates with the Army in the Field*.—The Delegates with the Army in the field are classified as follows :

(1) One Delegate General (*Generaldelegirter*). This Delegate is only appointed when the area of operations is very extensive, and when it is impossible for the Imperial Commissioner, in consequence of this, to exercise full control. The appointment of the Delegate General requires Imperial sanction. He acts as the representative of the Imperial Commissioner in the particular area to which he is appointed.

(2) A Delegate for the lines of Communication (*Etappendelegirter*) of each army. He is placed under the Inspector of the lines of communication, makes his arrangements in association with the Principal Medical Officer of the lines of communication, and comes in touch with the Principal Medical Officer of the Army only when under exceptional circumstances, as already noted, Voluntary Aid is employed in the first line.

(3) A Delegate with the Director of Military Hospitals in the Field (*Delegirter bei dem Feldlazarethdirektor*). He exercises control over Voluntary Aid work in military hospitals of the Field Army, and is immediately under the Delegate for the lines of communication. His work is carried out with the sanction and approval of the Director of military hospitals of the Field Army.

(4) A Delegate with the sick transport committee (*Delegirter bei der Krankentransportkommission*). He controls all Voluntary Aid work in connection with the distribution and evacuation of sick and wounded under the Delegate of the lines of communication.

(5) An Assistant Delegate (*Unter-delegirter*) at each dépôt station, as manager of Voluntary Aid dépôts. These dépôts are, as far as possible, affiliated to the hospital reserve dépôts. The duty of this Delegate is to manage all business matters and accounts connected with voluntary gifts, so far as these are non-official. He acts under the Voluntary Aid Delegate of the lines of communication, and co-operates with him in forwarding the *personnel* and material of Voluntary Aid Associations within the limits assigned to him by the railway authorities. So far as his connection with military authorities is concerned, both he himself and the *personnel* of the Dépôt which he manages are subordinate to the Commandant of the railway station where the dépôt is placed, in accordance with general military arrangements.

(b) *Voluntary Aid Delegates with the Garrison Army.*

(1) The Territorial Delegates retain their post and sphere as in time of peace.

(2) The Army Corps District Delegates also retain their posts with the General Officer who takes the place of the General commanding the Army Corps at the headquarters of the district, and carry on the same functions as in time of peace.

(3) A fortress Delegate is attached, as required, to the governors of fortified places. His work is regulated by instruc-

tions received from these officials. Should the resources of the fortress be incapable of supplying the *personnel* and material, application must be made by him to the Territorial Delegate.

(4) Reserve Hospital Delegates are appointed as required, to act within the sphere of the director of military reserve hospitals. Any *personnel* or material that is needed will be forwarded to them by the Territorial Delegates on requisition.

(5) Delegates for lines of communication (*Liniendelegirter*). One Voluntary Aid Delegate with the above designation is appointed to be with the Commandant of each line. His duties are to facilitate business between the Territorial Delegates of the garrison army and the Delegates of the lines of communication of the field army.

VOLUNTARY AID PERSONNEL.

All individuals who take part in Voluntary Aid work with the German army, including the Delegates, must be of German nationality, and belong to a class not liable to military service. An exception is made in the case of those who are liable to serve in the home reserve (*Landsturmpflichtige*), and should any such persons be attached for work with the Voluntary Aid Associations, a notification of the fact must be made to the military authority in whose district they live. A similar notification must be made should any such appointments be cancelled. Within these limits, the Voluntary Aid Associations and Orders of Knighthood have full power to select their own *personnel*, but each individual must be fitted to fill, in every respect, the position for which he is selected, and an irreproachable character, reliability, good health, bodily activity, as well as good education, are noted in the regulations as indispensable. In the case of doctors, approval of the War Office is required. The Voluntary Aid Delegates are obliged to submit to the military authorities, to whom they are attached, a nominal roll of all *personnel* under them and to notify all alterations in the list monthly. The Delegates on the lines of communication receive a copy of these lists and alterations from the delegates who are subordinate to them.

The whole of the *personnel* will wear the uniform and be in possession of the equipment laid down in the appendix to the regulations. The cost of fitting them out with everything

necessary in the way of clothing, &c., is borne by the Voluntary Aid Associations. It is laid down, however, that only those who bind themselves to serve for at least three months in the field shall be accepted and receive these field outfits. Male and female nurses may wear the uniform of an Order of Knighthood in the field, if entitled to do so. Male nurses and stretcher bearers may also wear Voluntary Aid uniforms during peace manœuvres, and while they are doing duty with the home garrison during war. Commanders of Voluntary Aid companies, the Assistant Commanders and the Medical Officers of the companies, who are employed in peace in the home territory, are entitled to attach to their uniforms the badges of rank noted in the appendix. The *personnel* of Voluntary Aid must wear at all times the Red Cross brassard, and carry with them the identification card authorising them to wear it. Voluntary Aid *personnel* are under the disciplinary control of the Assistant Commissioner and the Delegates, each in his own sphere, from the day they are called out to serve until the time when their period of service with the army expires. The punishments which these Voluntary Aid officials may administer are: (1) A simple reprimand; (2) a formal reprimand, with warning of discharge from the Voluntary Aid Service; (3) discharge from such service. A punishment book is kept, in which all punishments awarded will be noted. In addition to this disciplinary control, the whole of the Voluntary Aid *personnel* is subject to military law within the area of operations, and they are to be expressly informed of this on being accepted for service. In the case of complaints, the regular army regulations regarding the manner in which these are to be made will be followed. The Officers who are empowered to exercise direct command over the Voluntary Aid *personnel* are the Imperial Commissioner, the Assistant Commissioner, the Voluntary Aid Delegates, the Commander of Companies, the Assistant Commander of Companies, the Commanders of Sections of Companies, and all Officers or Medical Officers of the regular army who exercise command over any military units to which the *personnel* of Voluntary Aid may be attached.

DISTRIBUTION OF VOLUNTARY AID PERSONNEL.

All Voluntary Aid *personnel* employed with the field army or home garrison are divided into the following classes: (1)

Personnel for hospital duties (*Lazarethpflegepersonal*). (2) *Personnel* for accompanying convoys (*Begleitpersonal*). (3) *Personnel* for transport (*Transportpersonal*). (4) *Personnel* for duty at depôts (*Depotpersonal*).

The male *personnel* are formed into companies (*Züge*) of twelve files each, *i.e.*, twenty-four men. Each company is commanded by a Company Commandant (*Zugführer*), who has under him an Assistant Commandant. The Company is further sub-divided into two sections of six files each, each under a Section Commandant (*Sektionsführer*). The companies may be split up, and in such cases command of the second half company is taken over by the Assistant Commandant, or should a further division be necessary, the Company Commandant will select one of the members of the Company to take charge of such sub-divisions. It is laid down that in the selection of a Company Commandant care is to be taken that he is a man of wide general experience and education. In the formation of the companies of the Convoy and Transport *personnel* a few skilled carpenters and blacksmiths are to be enrolled if possible. In case of necessity, drivers and conductors from the regular army may be added to assist individual companies. Regulations as to the material with which Convoy and Transport Voluntary Aid Companies are to be equipped are at present in reserve.

METHOD OF EMPLOYING VOLUNTARY AID PERSONNEL WITH THE FIELD ARMY.

(a) *Hospital Duties*.—A Voluntary Aid hospital detachment will be formed for each army corps. It will be attached to the regular hospital of the corps concerned, and will consist of male nurses (of whom a portion must be trained as stretcher bearers), female nurses, and male or female cooks. These will be distributed amongst the hospitals along the lines of communication and stationary hospitals. A note has already been made regarding the occasions on which they may be employed with the field hospitals in the first line. The Voluntary Aid Delegate with the Director of Field Hospitals will be their chief, but in all matters connected with the exercise of their duties in hospital and discipline they will be subordinate to the senior medical officers of the regular medical service, in whose

hands rests the right to appoint each individual to a definite duty, and who are empowered, without reference to higher authority, to remove from the hospital any who, in their judgment, are no longer suitable for employment. Individuals so discharged will report themselves to their Delegate for further instructions. The senior Medical Officer of a hospital in discharging any Voluntary Aid *personnel* is obliged to give on demand to the individuals concerned a statement in writing on their conduct, the nature of the duties on which they were employed, and the period during which they served under him. Some special arrangements are made in the case of members of Orders of Knighthood who may be employed in military hospitals. These arrangements form one of the appendices to the regulations, and refer mainly to the supervision of the members of the Order by Knights of the Order and to other matters connected with special rules of the Order. There is no relaxation of the rule, however, which places them in subordination to the senior medical officer of the hospital to which they are attached.

(b) *Duties in Connection with Sick Convoys.*—A Voluntary Aid detachment of male and female nurses, a portion of the former being trained as stretcher bearers, assists the regular service in passing sick and wounded down the lines of communication to the reserve hospitals, and establishes and manages rest and dressing stations along the line. One such detachment will be formed for each line of communication, and be under the Delegate for the line of communication concerned. Its members will carry out the orders of the surgeon in charge of a convoy in all matters connected with the care of the sick and wounded.

(c) *Duties in Connection with the Transport of the Sick and Wounded.*—A special transport detachment of Voluntary Aid *personnel* will also be appointed to each line of communication, and will do duty at the hospital reserve depôt or with its transport column. It will consist of stretcher bearers, and their duties are to undertake the conveyance of sick and wounded from the advanced hospitals to the head of the lines of communication, and from railway stations to hospitals and *vice versa* within the lines of communication. They are employed in the first line only in special emergencies, as already noted.

(d) *Duties in Connection with Dépôts.*—A dépôt detachment of Voluntary Aid *personnel* is also formed in connection with each line of communication, to undertake the management of Voluntary Aid dépôts at the headquarters of the line, under the direction of the Voluntary Aid Delegate of the line, who is responsible for preparing the details of the work. The members of this detachment must have been trained in merchants' offices, or as forwarding agents. They will assist the Assistant Delegates at the collecting stations and establish subsidiary dépôts at intermediate stations along the line, as required. Members of this detachment may also be employed in piloting consignments of voluntary gifts by train from the collecting stations to the head of the line. The equipment of these dépôts will be arranged in accordance with instructions issued by the military authorities. These various Voluntary Aid detachments will assemble on the mobilisation at the localities most convenient to them, and will await further instructions there. The locality selected must be determined in time of peace.

METHOD OF EMPLOYING VOLUNTARY AID PERSONNEL WITH THE HOME GARRISON.

As with the field army, Voluntary Aid *personnel* is distributed for duties in hospitals, with convoys for transport purposes, and at dépôts. The *personnel* employed in hospital duties will be distributed amongst the reserve and fortress hospitals of the regular military service. They will also take over the whole work of any Voluntary Aid hospitals that may be established in the home territory. The convoy *personnel* will take over the duties of attendance on sick and wounded during their conveyance by railway or water within the home territory, and will also be employed in dressing and rest stations along the line. The transport *personnel* will be employed in conveying sick and wounded within the home territory from railway stations to hospitals, and *vice versa*. The dépôt *personnel* manage the Voluntary Aid stores at the base of the lines of communication at the frontier, and may be employed in accompanying the larger consignments of stores from there to collecting stations up the line. The strength and distribution of these various detachments in the home territory will be determined

according to requirements. They will be under the charge of the Territorial Delegate in whose district they may be employed.

COLLECTING AND FORWARDING OF GIFTS.

The regulations regarding the collecting and forwarding of voluntary gifts to an army in the field are somewhat extensive and detailed. The main principles are as follows: Voluntary Aid depôts for the reception of gifts, each with one Delegate and the necessary depôt *personnel*, will be formed at the headquarters station of each Army Corps district in the home territory. There will be one such depôt at the military hospital of the station, and another at the refitting establishment. They will be designated "The Reception Station for Voluntary Gifts, No. 1 and No. 2" respectively, "for the 1st, 2nd, 3rd, &c., Army Corps," as the case may be, and they will be under the General commanding the Army Corps. The whole organisation of these depôts must be as far as possible arranged in time of peace.

All gifts collected by the Voluntary Aid Associations, or by individuals, are to be directed to these reception stations only, whether they are intended for the sick and wounded in hospital or for men in the field; and the invoices sent with the gifts must clearly state the nature of the contents, their destination, and the reception station to which they are sent. Each package must also be marked and labelled with the same particulars as on the invoice, on two sides at least. All packages must be of moderate weight and capable of being handled easily. The military regulations with regard to the preparation of packages for transport by sea will be adhered to, and the military transport regulations hold good as regards their transport by land. Once they have been received into the Voluntary Aid Reception stations, as noted above, they are regarded as military stores and are carried free. The rule with regard to forwarding the goods to the front is that they shall be passed on in the order in which they are received, unless special instructions are given, to the collecting stations up the line, where they will be received by the Assistant Voluntary Aid Delegates and the depôt *personnel* under them in a section of the military goods depôt affiliated to the department for hospital stores. Space will be set apart in this depôt for the purpose by the Com-

mittee who are in charge of the dépôt and responsible for its establishment. The Voluntary Aid Delegate has to carry out the instructions of the Committee in accordance with the general military regulations for the interior working of the dépôt and collecting stations generally. Trains proceeding from these dépôts and collecting stations with consignments of voluntary gifts will be loaded under the direction of the Principal Medical Officer, and conveyed to the head of the lines of communication, with the concurrence of the Director of the military railways. The regulations recommend that such trains be accompanied to their destination by selected members of the Voluntary Aid Associations and by a military officer. The arrangements for storing, preparing inventories, forwarding, &c., of the goods are laid in the service regulations for the Goods Dépôt of the Collecting Stations. When the packages arrive at the head of the lines of communication they will be received in special dépôts established and managed by the Voluntary Aid representatives. They will be issued from these dépôts under detailed instructions from the authorities on the lines of communications, and any application from military officers in the field to have such goods sent to them should be made to the head of the lines of communication. A list of the gifts which it is desirable that the Voluntary Aid Association should prepare will be published from time to time by the Imperial Commissioner. It is specifically stated in the regulations that in the interests of the military arrangements gifts for the sick and wounded or for the fighting force should be such as are not provided officially under ordinary circumstances, or even under exceptional conditions. If required, receipts will be given for all gifts received, and opportunities will be given to Voluntary Aid Delegates to make themselves acquainted with the way in which they have been used.

EMPLOYMENT OF VOLUNTARY AID IN CONNECTION WITH THE DOMESTIC MANAGEMENT OF RESERVE HOSPITALS.

The reserve hospitals are official establishments in the home territory, and as noted in the earlier part of the regulations, one of the directions in which the regular service may be supplemented by Voluntary Aid is by taking over the management of the domestic arrangements of the hospitals, as, for

example, the dieting of the sick, hospital washing, &c. The charge of these departments will, in every respect, be subordinate to the official hospital authorities, and should any expense be incurred by the Voluntary Aid authorities in connection with them an arrangement will be made beforehand with the "Intendance" Officer and with the approval of the Principal Medical Officer of the Army Corps district concerned. In each case all the circumstances for which expenditure is required must be clearly explained. An imprest account may then be opened. No alteration will be made in the Official Regulations with regard to reserve hospitals in connection with the management of these departments by Voluntary Aid; and the Voluntary Aid *personnel* will merely carry out the rules laid down for the regular military *personnel*. They will keep, however, a proper account of any expenditure for which the Voluntary Aid Associations may afterwards receive reimbursement out of public funds.

THE ESTABLISHMENT OF RED CROSS SOCIETIES' HOSPITALS
(*"Vereinslazarethe"*).

The Red Cross Societies, Orders of Knighthood, or private individuals, may establish Red Cross Hospitals at their own expense, for the purpose of taking over sick and wounded from the reserve hospitals in the home territory. They must be equipped as a rule for not less than twenty beds, and only sick and wounded from the reserve hospitals may be admitted to them. These hospitals are to be placed under military discipline and control. The professional supervision will be exercised by the senior medical officer of the nearest reserve hospital, or in the case of larger garrisons, by the specially appointed director of reserve hospitals and by the principal medical officer of the Army Corps district. Discipline will be maintained among the wounded by the senior medical officer or directing Committee of the reserve hospital, or by a specially appointed committee, consisting of a military officer and the chief surgeon of the Voluntary Aid hospital. These will also be responsible for all official matters connected with the hospital. The General commanding the Army Corps district may hand over military buildings for the establishment of such hospitals on the proposal of his "Intendance" officer and after a report by the officers

commanding the garrisons concerned. Otherwise, the whole equipment and establishment of the hospitals are to be carried out by the Red Cross Societies, Orders of Knighthood, or private individuals themselves. Certain articles of hospital equipment may, however, be handed over from the military stores. These are to be handed back when the hospital is disestablished. Should an application be made for a grant in aid of the expenses of the equipment and maintenance of Red Cross hospitals, including expenditure in connection with the treatment of sick and wounded, a full statement of the circumstances must be put forward and a strict account kept.

THE MANAGEMENT OF RED CROSS SOCIETIES' HOSPITALS.

The general management of the Red Cross Societies' hospitals rests entirely with the societies and individuals concerned; and the co-operation of military or other officials only takes place, as already noted, in connection with discipline and where State interests are involved. The official regulations under this heading refer only to the conditions under which this co-operative control is exercised. The official side is represented by the military officer of the hospital committee, as referred to under the previous heading, and by a non-commissioned officer who is attached to the hospital for discipline, clerical purposes, and preparation of official returns under the supervision of this officer. All transactions, however, must be signed by both members of the committee. They are given a corresponding service stamp with the designation "Royal Hospital Committee of the Red Cross Society Hospital at —" ("*Königliche Lazarethkommission des Vereinslazareths zu —*").

Strict accounts have to be kept of receipts and expenditure, with the exception of expenditure on surgical material, food and hospital equipment, the management of which is entirely the concern of the society or individual. These accounts are to be kept in accordance with the regulations of the army medical service. A monthly return will be submitted to the senior "Intendance" officer of the army corps district in which the hospital is situated. This return has to show the pay of the military member of the committee, the extra pay (nine marks monthly) of the non-commissioned officer, payments to sick during their treatment in the hospital, payments to sick

officers and officials, office expenses, funeral expenses, and money payments to the Society, to which receipts and sick reports should be attached.

With regard to the reception and disposal of sick and wounded admitted into or discharged from the hospital, the regulations of the regular army medical service are in force, with the following modifications: (1) The sick are to be accompanied by a transfer certificate from the reserve hospital and will bring with them a complete outfit, including two shirts and a vest. Any other articles of clothing, or other property which may have been brought by the sick to the reserve hospital, will be kept there, and will not accompany the sick to the Society's hospital. (2) On discharge from the Society's hospital the patient will be sent back to the reserve hospital from which he was admitted. (3) In the case of death, a notification will be sent on the regular form to the reserve hospital concerned, with information regarding the place, time, cause of death, and hour of burial. Should there be no official reserve hospital in the immediate neighbourhood the information will be sent to the local government official direct, and through him to the reserve hospital with which the Society's hospital is connected. Sick returns will be sent from the Societies' hospitals to reserve hospitals under instructions from the Principal Medical Officer of the Army Corps district, as well as the patient's bed-head sheets, and when the hospital is disestablished, the admission and discharge book and the death register.

All the above arrangements and regulations regarding the establishment and management of Red Cross Societies' hospitals, or of certain departments of the official reserve hospitals by Voluntary Aid in the home territory, are carried out under the General Officer commanding the Army Corps district, through the Territorial Voluntary Aid Delegates, and are subordinate to these delegates, under the supervision of the military authorities.

PRIVATE NURSING HOMES.

Applications may be made for the reception of convalescents into private houses through the Committee of the Societies of the Red Cross, or Orders of Knighthood, and also by Government officials of the locality concerned. These applications will be sent to the Voluntary Aid Territorial Delegate and by

him to the General commanding the Army Corps district. They must be accompanied by a certificate from one of the above-named committees or Government officials to the effect that the people concerned offer a complete guarantee for the care of any sick and wounded that may be sent to them. The approval of the General commanding the district is also required before any private nursing homes may be established, and arrangements will also be made by him for placing the convalescents under the control of some definite military officer in his district. Supervision over these private nursing establishments is thus exercised by the military authority of the locality and the Principal Medical Officer of the Army Corps district, who may utilise the local official medical services. In conjunction with them the Territorial Voluntary Aid Delegates also exercise supervision over the private nursing establishments, and the civil officials of the locality are required to co-operate when asked to do so by the military authorities. The owners of nursing homes are obliged to inform the military authorities from time to time whenever a convalescent has completely recovered, as well as to make known any requirements connected with the patients, and if necessary to submit medical certificates at their own expense. Should it be necessary to retain a convalescent in any of the homes for a longer period than that appointed, the owner of the home, if he is prepared to still retain the patient, must apply immediately to the supervising military officer, and the application must be accompanied by a medical certificate. This officer must send in a monthly return of the number of military patients in nursing homes under his supervision to the General commanding the Army Corps district.

TRANSMISSION OF INFORMATION REGARDING SICK AND WOUNDED, &c.

Members of Voluntary Aid Associations who may be working in hospitals have assigned to them the duty of endeavouring to induce the sick and wounded to write to their relatives regularly, and in the case of patients who are unable to do so, to undertake the correspondence themselves, so long as there is no medical objection. At the official Central Information Bureau, Voluntary Aid is represented by two members, who will

undertake the distribution of information regarding the whereabouts of individuals of their own army, of the enemy's army, or of an allied army, and who may also co-operate in other work of the bureau.

GRANTS FROM PUBLIC FUNDS IN CONNECTION WITH VOLUNTARY AID.

A fixed sum is placed annually at the disposal of the Imperial Commissioner for the extra pay of his clerks, office disbursements, and travelling expenses when on inspection duty. During war the amount placed at his disposal will depend upon the proposals put forward by him or the Assistant Commissioner through the War Office. Free rations and quarters are provided for the Imperial Commissioner and Voluntary Aid Delegates with the field army. Other Voluntary Aid *personnel* receive free rations and quarters whether they are serving with the field army or home garrison. Persons, however, who are doing duty in their own locality and are living in their own homes will not receive these allowances except in case of need or special duty. Members of Voluntary Aid Associations may be granted a daily pay for duties performed in Government hospitals in the home territory, the amount being fixed by the War Office. Those employed with the field army are entitled to regular pay in accordance with a special provision in the Pay Warrant. Free medical and surgical treatment, medicines, &c., in or out of hospital, are given to Voluntary Aid *personnel* with the field army, but only under exceptional circumstances and when there is special need to those employed with the home garrison. In the case of permanent injury or sickness due to service in the field they are entitled to certain gratuities as soldiers, and in the case of death their families receive compensation from the State.

During peace the Imperial Commissioner and his Assistants are entitled to have their letters franked, and the correspondence between Territorial and Army Corps District Delegates, and between them and the recognised Voluntary Aid Associations, Orders of Knighthoods, or military authorities is also transmitted free, so long as it is concerned with preparations for mobilisation. All such letters must bear the stamp or seal of the office from which they are despatched and be marked "*militaria*." During war, the letters and telegrams of the

Imperial Commissioner and the Voluntary Aid Delegates are regarded as official, and the correspondence of the subordinate Voluntary Aid *personnel* is treated as soldier's letters under the regulations of the field postal service. Free passes are given to the Voluntary Aid *personnel* to travel by rail by second or third class during war. These passes are issued by the Imperial Commissioner and must indicate the nature and object of the journey. Free passages are also given in Government transports when the journey is by sea. Packages labelled "Voluntary Gifts" and addressed to the Voluntary Aid reception stations are conveyed free by rail or on Government transport. The Imperial Commissioner and Voluntary Aid Delegates are supplied during a campaign with Government horses, carriages, and grooms, according to a fixed scale laid down in one of the appendices.

METHOD OF MOBILISING VOLUNTARY AID.

The Voluntary Aid Associations commence their war duties on reception of the order to mobilise. The Imperial Commissioner proceeds at once on a communication from the War Office to the headquarters of the Commander-in-Chief in the field, in order to undertake the direction of the Voluntary Aid service with the army. The Assistant Commissioner takes over his office at Berlin. The documents appointing the Voluntary Aid Delegates with the field army are prepared and issued by the Commissioner.

The Territorial Delegates will get ready as quickly as possible lists showing the *personnel* and material that is ready for immediate use, along with a statement of the number of persons ready to proceed (1) for duty on the lines of communication with the field army; (2) for general duty with the home garrison, and (3) for duty only in the places where their homes are. The lists will be sent to the Imperial Commissioner. The Territorial Delegates will commence courses of instruction and exercises for the *personnel* already trained during peace, as well as for those offering their services for the first time. The Voluntary Aid Companies for hospital duties and for duty with sick convoys will be equipped and got ready first, and the voluntary gifts and hospital material intended for the army in the field will be prepared for despatch.

The Voluntary Aid Delegates for the lines of communication will proceed, on instructions issued by the War Office to the Imperial Commissioner or Assistant Commissioner, to the base of the lines of communication, and the Assistant Delegates to the collecting stations. They will take with them any assistants that may be absolutely necessary. Other Voluntary Aid *personnel*, including Delegates with the field hospital directors and sick transport Committee, will await further instructions at the places arranged for the assembly of Voluntary Aid *personnel*. The instructions will be sent by Delegates of lines of communication to the Assistant Commissioner.

The Territorial Delegates will be responsible for informing the military authorities of their district of any soldiers liable to serve in the home reserve, who are retained for employment with the Voluntary Aid Societies, and of the discharge of such individuals from their employment. The War Office will publish a notice calling upon all Associations, societies or individuals willing to assist in connection with Voluntary Aid to apply for employment to the Imperial Commissioner and to await instructions from him. A notice will also be published to the effect that the gifts intended for the hospitals or for the army in the field are to be addressed to the reception stations, which the Imperial Commissioner will appoint. Arrangements already planned and prepared in time of peace by the Red Cross Societies for equipping hospitals, &c., are to be completed as soon as the order for mobilisation is received, provided they are such as are intended to be ready by the tenth day of mobilisation. Arrangements that are planned to take more than ten days in mobilising, will not be commenced until a special order is issued.

These notes complete the details of the regulations. The appendices need not be considered in detail. They consist of : (1) A description of the field uniforms of the Knights of St. John and of the Knights of Malta ; (2) a description of the uniform and equipment of the Voluntary Aid Delegates with the field army ; (3) a description of the clothing and equipment of other Voluntary Aid *personnel* with the field army ; (4) a description of the badges of rank which the commanders,

assistant commanders, and surgeons of Voluntary Aid Companies wear during peace manœuvres, and when on duty with the home garrison during war; (5) special regulations regarding the employment of members of the Orders of Knighthood; and (6) a tabular statement of the number of grooms, servants, horses and waggons allowed to the Imperial Commissioner and his staff, to the Delegate-General, to the Delegate on the lines of communication, and to the Delegate with the field hospital, the Delegate with the sick hospital convoy, and the Assistant Delegates.

The difference between our position and that of Germany (and as a matter of fact, that of France, Italy, Russia and Japan as well) is, I think, clearly indicated in these regulations. In our case there is no peace organisation of Voluntary Aid that has got to the heart of the people, whereas in other countries the peace organisation of popular movements in aid of the sick and wounded in war is so extensive that official regulations for utilising them follow as a matter of course.

After the International Conference of Red Cross Societies in Vienna in 1897, a conference during which I had an opportunity for the first time of coming personally in touch with the Continental organisations, and which impressed me very forcibly with our failure as a nation to recognise the importance, both from a military and political point of view, of organising in time of peace the elements of which Voluntary Aid is composed, I ventured to submit the following remarks in the report on the work of the Conference. "In States where there is compulsory military service each home has a direct interest in the welfare of the sick and wounded amongst the troops, and under such circumstances it is an easy and natural process for Voluntary Aid Societies to spring into existence and become organised and maintained in a state of activity in time of peace." "In our country, however, there is no such peace organisation in existence. Voluntary Aid, such as would be forthcoming in abundance in the event of our being involved in an international war, would come upon the military authorities in the form of a mass of unorganised and untrained elements, probably so unsuited for the actual requirements of the moment that for a time at any rate the working and administration of the regular army medical service would be considerably ham-

pered and embarrassed." The report was instrumental in leading to the formation of the Central British Red Cross Committee under the authority of the Secretary of State for War. It must be acknowledged, however, that such a Committee is of itself insufficient, so long as the elements of which Voluntary Aid is composed fail in time of peace to form themselves into a definite network throughout the country to which popular sentiment will attach itself and upon which the military authorities can rely when war breaks out. Whether we shall ever as a nation be able to form an organisation of this kind, such as can be utilised and controlled in the same manner in which Voluntary Aid organisations are utilised and controlled by Continental powers, must depend largely upon an alteration in the standpoint of popular sentiment and its attitude towards the Army Medical Service on the one hand, and of the Army Medical Service towards it on the other. We are apt to regard popular sentiment as abstract and intangible; but in this, I think, we are wrong. It is likely to become an overwhelming power in the sphere of army medical work in any great war, and nothing will make it of greater value to the sick and wounded and help the Army Medical Service more than the careful and studied preparation during peace of channels into which it may be directed when war breaks out. At present popular sentiment in England has a tendency to regard military hospitals as the death-traps they were at the time of the Crimean War, and the work of the Army Medical Service of the country as inferior to the medical work to which the people are accustomed in civil life, overlooking the fact that war has really no counterpart in the comparisons which are made, and that the organisation of the medical services must progress more with the real and permanent advances in medical, surgical and sanitary science than with those which may be popularly attractive but which are apt to be ephemeral. The result, hitherto, has been to impel individuals and associations in the direction of acting independently of Army Medical Organisation rather than in the direction of placing themselves in co-operation with it and acting under its control.

[5] When the South African War broke out this attitude was distinctly prominent. The Central British Red Cross Committee were able to control it to a great extent, as is evident from

their report on the Voluntary Organisations in aid of the sick and wounded during the war, but the lack of local organisations amongst the people themselves, such as are recommended in the concluding portion of the report, led to vast sums of money being utilised in a manner which was a great help no doubt, but not in any way commensurate with the help that might have been afforded by the same amount of expenditure in detailed Voluntary Aid schemes, planned and thought out in time of peace, and known to and relied upon by the War Office authorities. Consider, for example, the useful work that might have been left entirely to Voluntary Aid in providing accommodation for and equipping the extra three thousand beds or so required for the sick and wounded as they arrived in this country from South Africa.* Little more than three hundred beds were found to be available amongst the civil hospitals in London and not many more than six hundred throughout the country, England and Wales (exclusive of Scotland and Ireland), for this purpose, and in default of a reliable Voluntary Aid scheme the War Office had to act independently of any desire on the part of the general public or individuals to help in this direction. Had popular sentiment taken up this branch of work during peace and had local committees prepared schemes for the expansion of hospital accommodation in the home territory in war, not only would the people's contributions in money, clothing, luxuries, &c., have been diverted into a really useful channel, but the people themselves would have had the satisfaction of coming into more direct touch with the work they were supporting than could have been the case in connection with private hospitals in the area of active operations in the field.

It is satisfactory to note that, as regards Voluntary Aid *personnel*, a commencement has been made in the desired direction by the organisation of the St. John Ambulance Brigade into companies of stretcher bearers for work with the Army Medical Service in the home territory, the official arrangements having now been completed for the mobilisation of ten companies of fifty-eight men each for this purpose. The St. Andrew's Ambulance Association in Scotland is also organising

* I do not refer to the accommodation in private homes offered for convalescents. That was over and above the hospital accommodation referred to.

on similar lines, and is endeavouring to create local committees for the consideration of Voluntary Aid schemes in the direction indicated in the report of the Central British Red Cross Committee, to which reference has just been made. These are peace organisations with an extensive hold on the country. The Army Nursing Service Reserve are also in touch during peace with a valuable reserve of nursing sisters for war, and the various branches of the St. John Ambulance Association throughout the country have been of material use in connection with the organised preparation and forwarding of voluntary gifts. But these peace organisations do not represent all the Voluntary Aid that will be forthcoming from every quarter in time of war, and there is much to be done in order to utilise the other elements in an organised manner and to the best advantage. It is not enough that schemes of supplementary aid to the Army Medical Service should be prepared by local committees and private individuals. They should be submitted to the inspection and criticism of a central authority, and the details and the extent to which they can be relied on in war should be known by periodical reports to the War Office through this authority. The organisation of the home army in army corps districts, each covering several counties, should facilitate the dovetailing of Voluntary Aid schemes into our army medical system, and these notes on the German regulations may help in directing popular sentiment towards achieving this end.

Editorial.

THE THERAPEUTIC VALUE OF YEASTS.

MANY of our readers are doubtless familiar with or can recall to memory the homely application of ordinary beer yeast for the cure of boils, carbuncles and other inflammatory conditions. The empiricism of the housewife is now being replaced by the more exact work of the man of science, and an increasing literature on this subject draws attention to the various diseases over which yeast exercises a controlling influence, also to the different forms and methods of its administration.

We believe that Presta and Taruella (*Revista de Med. y cirugía*, June 15, 1901) were the earliest workers to adduce experimental proof of the value of yeast, the most important of their conclusions being the following: (1) Beer yeast exercises a local and general curative action upon streptococcal and staphylococcal infections in rabbits, when administered hypodermically for five to twelve days in 10 cc. doses of a well-grown culture; (2) similar injections repeated for four consecutive days render rabbits immune to these coccal infections; (3) the curative principles of yeast are intracellular, and act only after liberation by a leucocytic or humoral ingestion of the cell; (4) blood serum of rabbits treated by yeasts has an agglutinating action upon *Streptococcus* and *Staphylococcus albus* and *aureus*. Yeast cultures in beef and barley medium show this same power after two days' growth, and lose it when heated to 55° C.; (5) mixed cultures of yeast and streptococcus and staphylococcus produce attenuation of the virulence of the latter; (6) in the pus of a subject treated by yeast the pyogenic organisms decrease in number and in virulence. Only about seven-tenths of an average sample of beer yeast consists of *Saccharomyces cerevisiæ*, the rest being impurities. If a yeast be kept in a dry but cool place it is capable of secreting its soluble ferments after a long lapse of time; moisture and warmth alter its character rapidly, mainly by enabling the impurities to replace the true *Saccharomyces cerevisiæ*. The results obtained by yeast in the treatment of boils and carbuncles are apparently due to its antiseptic, phagocytic and immunising

action, and not to any specific action upon particular pathological lesions. Numerous observers have obtained surprising results with yeast in the treatment of boils and carbuncles, and failure in the hands of others may be attributed to the impure quality of the preparation used. Infantile diarrhœa, infective and mucomembranous enteritis or dysentery, have all been much relieved by the action of beer yeast.

As far back as 1895 Cassaët recommended beer yeast for the treatment of diabetes mellitus, its beneficial action in this disease depending upon the conversion of all starchy elements into alcohol; thus the invertin which it contains changing cane sugar into glucose, and its diastase converting the glucose into alcohol. Boigey, in a recent paper (*Arch. Gen. de Med.*, April 7, 1903) confirms these theoretical considerations and maintains that in beer yeast we have a valuable remedy in diabetes. He ascribes to yeast a phagocytic action, a toxic secretion which is bactericidal, and a stimulating secretion producing leucocytosis. These actions being vital phenomena, their manifestation must depend upon the condition of the yeast and the intestinal contents at the time of ingestion. Beer yeast normally grows in a neutral medium and at a low temperature, and when taken into the stomach undergoes digestion, the quantity of its various secretory products being inversely proportional to the rapidity of digestion. From this it is obvious that to obtain the maximum effects from yeast, we must employ cultures which have been more or less educated up to the conditions under which we wish and expect it to act. For this reason the use of pure grape yeast, acclimatised to an acid medium and a body temperature, offer the best chances of success. Boigey used *saccharomyces* of grapes of warm countries active at a temperature of 35° to 39° C., and grew them on a medium having an acidity equal to that of the stomach. He also administered some of the active medium at the same time as the yeast, thereby enabling the latter cells to continue to elaborate their secretory products or ferments. The results in diabetes have been most encouraging, especially after the employment of a yeast artificially acclimatised to the gastric juice and one of recent growth. This last desideratum raises an important practical point, as yeasts are specially liable to variation, and their preservation, in active form, necessitates the employment of suitable cold storage chambers. It is true that dried prepara-

tions can be obtained, by evaporation, from moist recent growths ; these preparations are certainly easy to handle, but somewhat erratic in their activity. We have recently examined several samples and found that many contained only the *débris* of the yeast cells. A good preparation should show, under the microscope, complete healthy cells. There is reason to believe that much of the diarrhoea and dyspepsia frequently observed after the administration of yeast is attributable to the use of dried inefficient preparations.

We have alluded already to the value of yeast in furuncular affections, and a suggestive article by Boix in the *Arch. Gen. de Med.*, May 12, 1903, emphasises the satisfactory clinical results obtained by various observers in the staphylococcal and streptococcal infections as well as in exanthemata. Presta and Taruella (*Revista Ibero-Americana de Ciencias Médicas*, 1902, p. 368, and *Gac. med. Catalana*, 1903, March 15) have treated forty-three cases of variola, twenty-four of erysipelas, twenty-eight of measles, seventeen of scarlet fever, also adenitis and whitlow, successfully by administration of three teaspoonfuls of dried yeast daily. Muntorid observed a pulmonary pyorrhoea cease in a week under the influence of yeast, while Molist reports a case of mastoid abscess and Felgar a case of recurrent or chronic appendicitis cured by its use. Without going so far as to suppose that in yeast we have found a panacea for these various human ailments, we are bound to admit that the experimental and clinical facts are both suggestive and encouraging. Much accurate work has still to be done, but we hope that, by referring to what has already been noted, others may be stimulated to inquire further into the feasibility of regarding yeast as something more than a mere agent for the production of fermented liquor.



Review.

A MONOGRAPH OF THE TSETSE FLIES. By E. E. Austen. London: Longmans and Co., 1903. Nine plates with 16 figures in the text. Pp. 319. Price 15s.

The rapid accumulation of facts regarding the infection of man and beasts with the different species of trypanosoma renders the appearance of this work of immense value and interest, as it furnishes all that is known about the genus of flies to which the name of *Glossina* has been given. It is based on the collection in the British Museum, and has been printed by order of the Trustees with a view not only to supply a *résumé* of our knowledge of the tsetse flies, but also to enable those who may be engaged in Africa itself upon the investigation of the maladies produced by the various species of trypanosoma, to determine the species of *Glossina* responsible for the dissemination of the hæmatozoon. The preparation of the systematic portion of the volume appears to have been a matter of some difficulty, owing partly to the remarkable dearth in the genus *Glossina* of structural characters, such as might be utilised for the distinction of species, and partly to the faulty condition of much of the material available for examination.

Since the insects which form the subject of this monograph were first discovered by Englishmen, in the vicinity of the Limpopo, the word tsetse was long used by us to mean *Glossina morsitans*, and that species only. Even now it is so used by the majority of persons who are unaware of the existence of more than one species of *Glossina*. With the opening up of Africa and the recognition of fresh species, the use of the word tsetse needs to be used in a generic rather than a specific sense, and it is in a generic sense that it is employed in this work. It has yet to be discovered whether all the species of *Glossina* are capable of conveying the hæmatozoon of tsetse fly disease, but the species of the genus differ so markedly from other blood-sucking flies in various details of external structure, as well as to their appearance when at rest, that it is impossible to speak of a particular species as the true tsetse fly in contradistinction to the others. It follows, therefore, that the name tsetse must be taken as the equivalent of the genus rather than of any one species, even the one which is best known.

A highly technical description of the genus *Glossina* and of the seven known species (*G. palpalis*, *G. pallicera*, *G. morsitans*, *G. pallidipes*, *G. longipalpis*, *G. fusca*, *G. longipennis*) are given in chapter iv., but it may not be out of place to give here a short description of these flies, so that a non-entomological reader may recognise a tsetse specimen at sight. Tsetse may be described as "ordinary-looking, sombre, brownish or greyish-brown flies, varying in length from $3\frac{1}{2}$ to $4\frac{3}{4}$ lines ($7\frac{1}{2}$ to 10 millimetres) in the case of *G. morsitans* to about $5\frac{1}{2}$ lines ($11\frac{1}{2}$ millimetres) in that of *G. fusca* or *longipennis*, with a prominent proboscis in all species. The hinder half of the body or abdomen in the best known species, though not in all, is of a paler colour and marked with sharply defined dark brown bands, which are interrupted on the middle line: the abdomen, however, is invisible

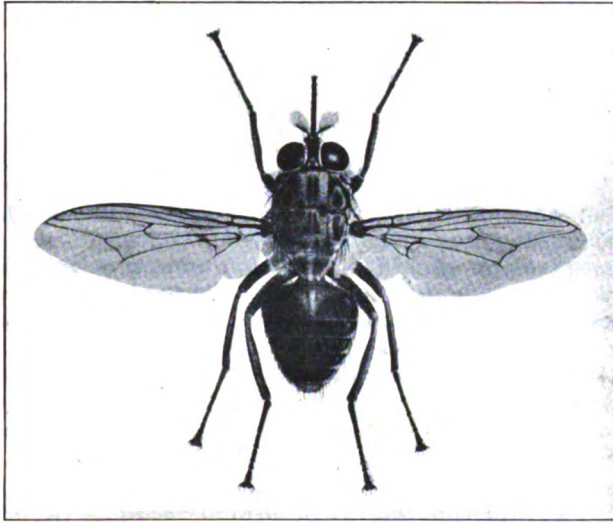


FIG. 1.—*Glossina palpalis*, Rob. Desv., ♂. ($\times 3\frac{3}{4}$.)

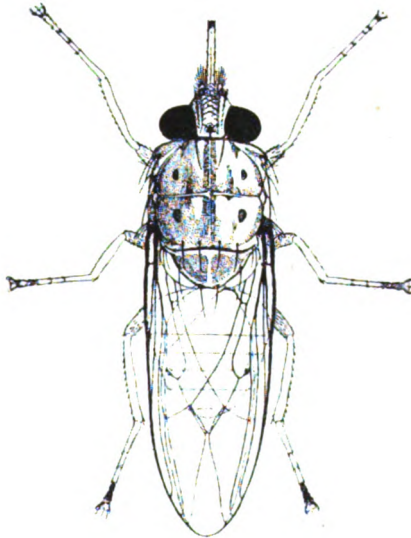


FIG. 2.—A Tsetse-fly (*Glossina longipennis*, Corti, from Somaliland) in resting attitude, showing the position of the wings. ($\times 3\frac{1}{2}$.)

when the insect is at rest, as it is then concealed by the wings. The sexes of tsetse flies can readily be distinguished when specimens can be examined, since in the male the external genitalia form a conspicuous knot-like protuberance (hypopygium) beneath the end of the abdomen, which is absent in the female." It is probable that only those who have suffered from the attacks of tsetse can recognise them when on the wing, but in the resting position their identification is easy. "In this attitude they can be distinguished from all other blood-sucking diptera, especially from those belonging to the genera *Stomoxys* and *Hæmatopota*, which are most likely to be mistaken for them, by the fact that the brownish wings lie closed flat over one another down the back, like the blades of a pair of scissors, while the proboscis, ensheathed in the palpi, projects horizontally in front of the head." To facilitate the conception of the size of these flies, it may be stated that an ordinary house-fly in Europe measures about 3

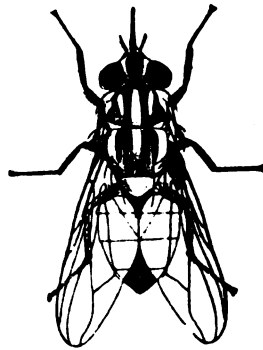


FIG. 3.—*Stomoxys* sp., from Natal, in resting attitude, showing the position of the wings. ($\times 4$.)

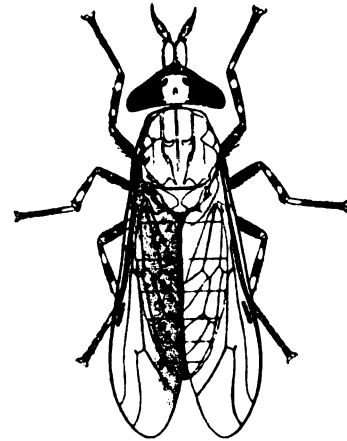


FIG. 4.—*Hæmatopota* sp., from Zululand, in resting attitude, showing the position of the wings. ($\times 4$.) The wing markings are omitted.

lines, or 7 millimetres; on this basis *G. morsitans* measures about half an inch, from the tip of the proboscis to the ends of the closed wings; *G. fusca* is about three-fourths of an inch. Apart from the prominent proboscis and the mode of carrying the wings when at rest there is nothing remarkable or striking about the appearance of a tsetse fly. *Stomoxys* and *Hæmatopota* are the only two species likely to be confused with *Glossina*. The females of both are greedy blood-suckers and often torment domestic animals. Although *Stomoxys* has a prominent proboscis, it is ensheathed in the palpi, and is consequently finer than that of *Glossina*. The various species of the former are small greyish flies with black markings; they are smaller than tsetse flies, and their wings when in the resting position diverge at an angle, like those of the house-fly. *Hæmatopota*, which is a small horse-fly of the family *Tabanidæ*, has a superficial resemblance to *Glossina* when

at rest. The species of this large genus are of about the same size as the larger tsetse flies, and of the same colour and elongate shape. Their abdomen, however, is never marked with dark bands on a light ground, neither do their wings close over while in the resting position, but diverge slightly at the tips and meet together at the base like the ridge of a house-roof. Their antennæ, too, project horizontally in front of the head, while those of tsetse flies and all Muscidæ are drooping. With the permission of Professor Ray Lankester and Mr. Austen we are able to reproduce some drawings from this work, which we hope may materially help our readers to understand the superficial features of this group of flies; but for exact details the monograph itself must be consulted.

Considerable space is devoted, in this volume, to an analysis of the evidence regarding the tsetse fly areas or belts, and in this connection the reader's

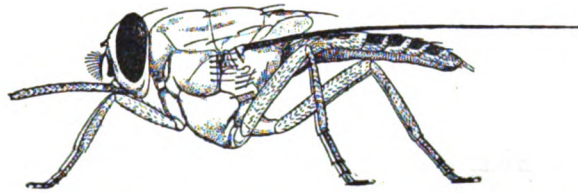


FIG. 5.—A Tsetse-fly (*Glossina morsitans*, Westw., ♀), before feeding. ($\times 5$.)

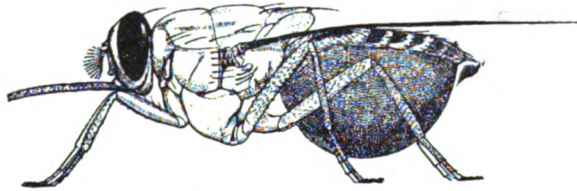


FIG. 6.—A Tsetse-fly (*Glossina morsitans*, Westw., ♀), after feeding, showing abdomen distended with blood. ($\times 5$.) From a drawing from life by Mrs. Bruce.

attention is directed to a particularly good bibliography; but it must be borne in mind that the limits of a "fly belt" are not necessarily the same to-day as they were even a few years ago, while in certain cases the belt itself may have ceased to exist. The tsetse fly is undoubtedly gregarious in its instincts and particularly local in its distribution, being found only in warm, moist tracts near water, where cover occurs as bush or forest. These facts point to a connection between the fly and game, and Mr. Austen is disposed to think that were it not for the big game, on the blood of which it feeds, the tsetse would soon cease to exist, at least in numbers sufficient to be formidable. The tsetse appears to pass the night resting on the ground or on the smaller branches of bushes or trees, and although there is a general belief that fly belts may be crossed with impunity during darkness, there is much evidence to show that this is not invariably the case. Contrary to what is the case among horse-flies (*Tabanidæ*), of which the females alone

suck blood, in the tsetse both sexes are blood-suckers. Another curious fact is that odour, which has so strong an attraction for many diptera, especially of the family *Muscidæ*, to which the genus *Glossina* belongs, has precisely the opposite effect on the tsetse flies. For this reason they avoid the presence of man, and are rarely found within houses or towns. Until the publication of Lieut.-Col. Bruce's classical report on Nagana, the tsetse fly was believed to lay eggs and breed in the droppings of the buffalo, like the flies belonging to the closely allied genera, *Stomoxys* and *Lyperosia*, which undoubtedly breed in dung. According to Bruce, the tsetse fly does not lay eggs at all, but extrudes a yellow-coloured larva, which is furnished with a black hood at one end and two minute spikes at the other. It is annulated and consists of twelve segments. On being born the larva creeps actively about, evidently searching for a hole or cover in which to hide. Having found seclusion, it immediately changes colour and in a few hours becomes a jet-black hard pupa or nymphe. The perfect insect hatches out in about six weeks. In these metamorphoses the tsetse fly shows a similarity to the mode of reproduction among certain parasitic flies belonging to the family *Hippoboscidæ*.

We have dwelt at some length on the contents of this book, as an accurate knowledge of blood-sucking flies is clearly indispensable for further progress in the inquiry as to the dissemination of trypanosoma. On many points further observation is needed, especially as to habits, locality and life-history of blood-sucking insects. In no way will this be better secured than by a study of this fascinating volume, which, in addition to its scientific details, gives an extensive bibliography of references and reports by many observers. A map of Africa illustrating the present knowledge of the distribution of *Glossina* is also given.

R. H. F.



Current Literature.

I.—MEDICINE AND SURGERY.

Obliteration of the Superior Vena Cava.—Osler (*Bulletins of the Johns Hopkins Hosp.*, July, 1903) records two cases of the rare condition of obliteration of the superior vena cava. Compression of the vessel is not uncommon in aneurysm of the aorta and in mediastinal tumours, but only twenty-nine cases of obliteration have been recorded. They can be classified as follows: (1) Thrombosis, due to disease within the vein; (2) disease outside the vein—tuberculosis, syphilis, mediastinitis, aneurysm, periaortitis, carcinoma, and fibroma. The symptoms depend on the degree to which a collateral circulation is established. Any one of the three great veins of the body may be obliterated for years with good health and a complete collateral circulation. Professor Osler has observed the following cases in which the obliteration was due to tuberculosis and lymphadenoma respectively.

A man, aged 22, was admitted to hospital on December 7, 1898, complaining of dyspnoea. Six weeks before he awoke one night with dyspnoea, and found that his neck was swollen. The face and eyelids were puffy, the vessels of the neck were distended with blood, and there was general pulsation of the neck. The superficial veins of the thorax and the right upper arm and shoulder were dilated. On December 21 he was discharged improved. On December 1, 1899, he was readmitted, complaining of pain in the chest and swelling of the face. Exertion caused the veins of the face and neck to swell. The superficial veins of the forearm were dilated, and the thoracic subcutaneous veins anastomosed with the superficial and deep epigastrics. Radiography revealed nothing abnormal. In June, 1900, the veins were more dilated, and there were signs of tuberculosis of the right lung. In February, 1901, he died in an attack of dyspnoea. The necropsy showed that the innominate veins and upper part of the superior vena cava were obliterated and formed a fibrous mass, adherent to the spine, which at this point was eroded. There were many tubercles in the lungs. In the second case the patient was a man, aged 31, suffering from lymphadenoma. Similar symptoms of venous obstruction began. He died four years later. The necropsy showed that the superior vena cava was completely obliterated by the enlarged glands.

Subparietal Injuries of the Kidney.—F. S. Watson (*Boston Med. and Surg. Journ.*, July 9 and 16, 1903) publishes an important paper on this subject, based upon six cases observed by himself, and a review of the previously published cases, which amount to 660. He points out that laceration and serious injury to the kidney may be produced by muscular action, and by what seems very inadequate force. Thus Kellermann has recorded the case of a man who made a sudden spring backwards and felt a violent pain in the left renal region. At the first micturition there was hæmaturia, which lasted four days; fever and swelling in the left loin followed. The

latter increased gradually, and an incision on the eighteenth day proved it to be a perinephritic abscess. In another case a man ruptured his kidney with fatal result in the effort of delivering a blow while boxing. In twenty cases blows or falls upon the front of the abdomen were stated to have been the cause of laceration of the kidney. These cases are exclusive of injuries to the kidney from a crushing force passing over the abdomen while the patient was lying on the back. When a single intraperitoneal organ is injured, in association with lacerated kidney, it is always on the same side as the injured kidney. If the right kidney be injured the liver or ascending colon may be involved, never the spleen or descending colon. If there are multiple intraperitoneal injuries this rule of course does not apply. But as such cases are very rare, while injury of a single organ in association with laceration of the kidney is common, this fact is important when laparotomy is performed, and the abdomen found full of blood, for time need not be lost in looking for the source of hæmorrhage upon the side of the uninjured kidney. In the great majority of cases the spleen is involved in connection with the left kidney, and the liver with the right. The hæmorrhage comes from the kidney in an even larger proportion of cases than from the liver or spleen. After laceration of the kidney abdominal symptoms may appear immediately or as late as the second day. Several cases of severe and even fatal injury have been recorded in which there were at first no symptoms. Thus a child was run over by a cart, the wheel passing over the abdomen. An hour or two later it was brought to hospital and played about the floor. Then sudden collapse followed, and death took place three hours later. There was no blood in urine passed soon after admission. The necropsy showed laceration of the right kidney and liver. Out of 486 uncomplicated cases of renal injury, tumour of the loin was observed in 111. In 39 the tumour was a perirenal hæmatoma, in 4 hæmatonephrosis, in 28 hydronephrosis, in 38 perinephritic abscess, and in 2 pyonephrosis. In the cases of hæmatoma and hæmatonephrosis the tumour usually appeared immediately, but sometimes not for days, in one as late as twenty-one days after the injury. In the cases of hydronephrosis the tumour appeared from the first to the fifty-sixth day; in the cases of abscess it appeared from the fourth to the thirty-fifth day.

Treatment.—Operation will be necessary if the hæmorrhage is severe or progressive. In one case the writer performed suture of the renal wound—an operation which appears to have been performed only six times previously. A man fell while stepping off his cart, striking the left side of the back. There was great pain, and hæmaturia followed for four days. Then it suddenly ceased and a tumour developed. The kidney was exposed in the loin. It was surrounded with blood and more than twice the normal size. There was a laceration from which protruded beneath the capsule a clot, which had dissected the latter from off the organ over nearly the whole posterior surface. The capsule was excised and the clot expressed. The renal wound was closed with seven catgut sutures. Hæmostasis was complete. After recovery from the operation a urinary fistula remained. In five of the other six cases suture of the renal wound was successful; in the remaining one nephrectomy had to be performed later, and proved fatal.

Interstitial Complicating Uterine Pregnancy.—J. B. Morrison (*New York Med. Journ.*, June 27, 1903). A multipara, aged 35, aborted at the eighth week, and came to the writer on the following day. The uterus was of about the size of an orange, and continuous with it on the right side was felt an ovoid mass of about half its size. This was thought to be a fibroid, or old inflammatory lesion. Against advice the patient went away and did not return for fifteen days. She had had a chill, fever for two or three days, and a foul discharge. Under anæsthesia the uterus was curetted. Some clots and shreds of decidua were removed. Two rigors, with temperatures of 105° followed, and agonising pain developed in the right side of the pelvis. Tenderness prevented examination. The abdomen was rigid. For two days the temperature ranged between 102° and 104°. On the fourth day profuse uterine hæmorrhage occurred and the abdominal rigidity disappeared. The mass on the right diminished. During examination a ten to twelve weeks' fœtus was expelled. Under anæsthesia the cervix was dilated. The interior of the uterus was smooth, but on the right was a cavity a little larger than an egg, to the edges of which pieces of tissue appeared to adhere. On the floor the finger slipped over a smooth mass, which proved to be the placenta. As much of it as possible was removed and the cavity was irrigated. For five days pieces of placenta came away.

Beckman has divided cases of interstitial pregnancy into two groups. In one (tubo-uterine) the communication with the uterus persists, and early abortion into the uterus takes place. In the second (true interstitial) the gestation is separated from the uterine cavity by a muscular septum, and the sac ruptures into the peritoneal cavity or uterus. Evidently this occurred in the case related above, the shreds felt probably being the remains of the septum.

The Distomum Ringeri.—The eggs of this worm were first found in the sputum, in 1878, by Baelz, who mistook them for gregarines. A year later Ringer found numbers of the parent worm in the lungs of a Portuguese who had died of an aortic aneurysm. Zenjiro Inouye (*Zeitsch. f. klin. Med.* Bd. 50, Hft. 1 und 2, 1903) gives an interesting account of distomiasis in Japan in certain regions of which it is endemic. In the hospital of Okayama there were 87 cases of pulmonary distomiasis among a total of 20,793 cases admitted during the seven years 1891-1897. Between 1885 and 1887, among 1,761 cases of respiratory disease at Kumamoto there were 103 cases of distomiasis, which therefore formed 5.9 per cent. of the total. It is commonest in villages with a good water supply, situated on mountains or hills along the banks of the three largest Japanese rivers, ten to fifteen miles from the coast. The liver fluke (*Distomum hepaticum*) is commonest near the mouths of these rivers in low-lying and marshy districts. Males are more frequently affected than females, and peasants more frequently than any other class.

The first symptom is usually hæmoptysis, and appears in the spring twice as often as at other seasons. There is slight cough. The sputum is rusty, yellow, or dark red; bright frothy blood is exceptional. It frequently contains pus, is ropy from the quantity of mucus it contains, and has a peculiar odour. The quantity of sputum varies from traces to several

ounces daily. The temperature is seldom raised unless there has been profuse hæmoptysis. The writer believes that hæmoptysis in distomiasis is due to after-hæmorrhage from the wounds inflicted by the suckers of the parasites. The adult worms are occasionally expectorated. The eggs are constantly present in the sputum and serve as a ready means of diagnosis. They are larger than those of any other common parasite, measuring 0·08 to 0·1 mm. in length and 0·05 to 0·06 mm. in width, and have a thin, chitinous shell with an operculum. In children and old persons who swallow the sputum they are found unchanged in the fæces. They resemble those of *Bothriocephalus latus*, but are much larger. Charcot-Leyden crystals are constantly present in the sputum. The physical signs in the lungs may be slight or entirely absent, and are usually less marked than in phthisis. There may be localised patches of dulness, or retraction of the thoracic wall from secondary pleurisy, which is not uncommon, and may give rise to thoracic pain. The auscultatory signs are those of bronchial catarrh. Occasionally there may be asthmatic attacks. Secondary anæmia may occur from the constant though slight hæmoptysis; but marked disturbance of nutrition is rare, unless pulmonary tuberculosis complicates the disease. This complication is seldom recognised early as the symptoms are attributed to the parasite. A complication of more interest is cerebral distomiasis, nineteen cases of which have been reported in Japan. There may be general or unilateral convulsions, hemiplegia, monoplegia, amblyopia, vertigo, aphasia, localised hyperidrosis, or imbecility. It is unknown how the eggs or the parasites reach the brain. Possibly the former are carried by the circulation. In the lungs and brain the worms lie in cavities, usually in pairs, surrounded by a slimy *débris* of ova and Charcot-Leyden crystals. These cavities were formerly supposed to be due to inflammatory necrosis, and those in the brain probably have this origin. But the writer has shown that the pulmonary cavities are lined with pavement epithelium and are true bronchiectases. Yamagiwa believes that the parasites penetrate the intestinal wall, omentum, liver and diaphragm, and so reach the thoracic cavity; he claims to have demonstrated the course taken by finding *post-mortem* nodules and adhesions in these positions. In addition to the lungs and brain, the parasites or their ova have been found in the liver, great omentum, intestinal wall, diaphragm, cervical glands, Poupart's ligament, orbits, eyelids, and scrotum. The life-history of the parasites is imperfectly understood. The eggs give rise in water to free-swimming embryos, which develop into cercaria in an intermediate host, possibly a mussel, in which form they are eaten by man. They infest, besides man, the cat, dog and tiger. The prognosis is good in uncomplicated cases, and the symptoms may slowly subside if the patient leaves the distomum region. As regards the diagnosis, Baelz states that in Japan distomiasis should be suspected whenever there is persistent hæmoptysis, especially in subjects who obtain sufficient nourishment, and present no physical signs.

Paraffin Plugs in Mastoid Operations.—In the majority of cases of acute mastoiditis it is unnecessary to open the antrum. The mastoid abscess and the pus in the tympanum are usually separated by healthy bone, and the tympanic suppuration can be arrested by thoroughly scraping and gouging the diseased mastoid cells. Thus Hammerschlag

has reported fifty-six cases of acute mastoiditis from Politzer's clinic in Vienna, in thirty-three of which the mastoid cells were opened without disturbing the antrum. The results were good and the duration of treatment was less than in the cases in which the larger operation was required. Grüber has attempted to curtail the duration of the after-treatment still further by immediate closure of the skin incision. But though the cutaneous wound may heal by first intention the air-containing cavity in the bone usually suppurates and a fresh incision is required. To obviate this difficulty, Professor Politzer (*Wien. med. Woch.*, July 25, 1903) obliterates the cavity by filling it with previously boiled molten solid paraffin. The paraffin sets into a solid mass and the skin is brought together over it by sutures or Michel's clamps. As even with the greatest care some necrosed bone may escape removal, it is usually advisable to postpone filling the cavity with paraffin until it has become lined with healthy granulations and the discharge is serous. If no healthy bone intervenes between the tympanum and the mastoid cells, so that an opening into the antrum cannot be avoided, the method is seldom applicable, because the molten paraffin may pour through the antrum into the tympanum, where its removal may be impossible. In one case only in which the antrum had been opened was paraffin employed; the orifice of the antrum had in the course of treatment become obliterated by granulations. The results were excellent, and in every case the paraffin healed in the wound without any inflammatory reaction. The following is one of four cases reported:—

A man, aged 26, was admitted to hospital on November 14 for purulent otitis media, which had begun acutely a few weeks previously. The mastoid process was tender, the temperature was 102.6° F., and the pulse 103. The face was flushed, and there was headache. On November 17 the mastoid process was opened. The vertical portion was filled with granulations down to the apex, and in places there were drops of pus. After all the diseased bone had been removed with the sharp spoon the bone surrounding the antrum was found to be healthy. The antrum was therefore not opened. The resulting cavity was of the size of a small walnut. It was plugged with iodoform gauze and the skin incision was partially closed with Michel's clamps. Three days later suppuration had ceased. On the seventh day the cavity was lined with healthy granulations. It was filled with warm, previously boiled solid paraffin, and after this had set the skin was brought together with Michel's clamps. Three days later the clamps were removed and the wound had healed. Seven months later there had been no relapse.

Paralysis of the Fourth Nerve in Suppuration of the Antrum of Highmore.—It has long been recognised that certain chronic ocular diseases may depend on, or be prolonged by, diseases of the nose and its accessory cavities, and are only curable by treatment directed to the nasal condition. The conjunctiva, cornea and lachrymal duct are most frequently affected from this source. But that ocular affections of this origin are not limited to these structures is shown by a case of paralysis of the troclear nerve reported by Krebs (*Therapeut. Monats-*

hefte, September, 1903). A man, aged 24, was admitted to hospital [on September 27, 1901. In 1898 the right upper molar tooth became carious. Eight weeks before admission there were violent toothache on the right side and a fœtid discharge from the right nostril. The pain subsided partially after the extraction of the tooth, but a few days later conjunctival smarting, epiphora, photophobia and diplopia appeared on the right side. No improvement followed the administration of iodide of potassium and salicylate of sodium. On admission there were right conjunctivitis and epiphora. The left eye was normal. The movements of the right eyeball were greatly restricted when directed downwards, or to a less extent outwards. When the eyes were directed straight forwards there was no diplopia, but as soon as they were depressed below the horizontal plane two images appeared, that of the right eye being below that of the left. The distance between the two images became greater the more the eyes were directed downwards. On looking downwards and outwards or downwards and inwards, homonymous diplopia appeared, the image of the right eye being still below that of the left. This could be due only to paralysis of the fourth nerve. The left nostril was normal, but in the middle and superior meatus of the right nostril was a quantity of greenish-yellow pus. The discharge was removed by the douche, but was immediately replaced by fresh pus which came forwards beneath the middle turbinate bone. On transilluminating the maxilla the right maxillary antrum and the right pupil remained dark.

The right antrum of Highmore was opened through the socket of the first right molar tooth and irrigated. A quantity of cheesy material and pus escaped from the nostril. A silver plug was placed in the alveolar opening and the patient was directed to irrigate the antrum with boracic lotion thrice daily. Immediately after the operation headache, toothache and conjunctival smarting disappeared but the diplopia was more resistant. It disappeared gradually and *pari passu* with the maxillary suppuration. Nine months after the operation recovery was complete.

Though troclear paralysis as a complication of suppuration of the antrum has not previously been noted, the evidence that the two were connected in this case appears to be conclusive. The paralysis appeared shortly after the unilateral nasal discharge, and disappeared with the antral suppuration. The concomitant conjunctivitis and epiphora pointed to an inflammatory rather than reflex origin of the paralysis, though what was the exact process in or behind the orbit which paralysed the fourth nerve or the superior oblique muscle, and why the muscles nearer the antrum should have been passed over, it is impossible to say.

II.—HYGIENE AND PATHOLOGY:

The Detection of Boiled from Unboiled Milk.—Schardinger, in the *Zeitsch. für Untersuch. der Nahr. und Genussmittel*, 1902, 1113, suggests the following procedure with methylene blue: 20 cc. of the milk are mixed in a tube 18 cm. long and 1.5 cm. in diameter, with 1 cc. of a solution containing 5 cc. of a saturated alcoholic solution of methylene blue and 5 cc. of formalin (that is, 40 per cent. of formaldehyde) in 190 cc. of water. The tube and its contents are then placed in a

water bath at a temperature of 45° to 50° C. In the case of unboiled milk the solution is decolourised in about ten minutes, whilst no discharge of colour takes place should the milk have been boiled. The limit temperature for this reaction seems to be about 80° C. A similar methylene blue solution, but without the formaldehyde, is sometimes decolourised, but not always, by raw milk. From certain bacteriological experiments the author comes to the conclusion that the reaction is due to bacteria in the milk.

Another colour reaction which is of some interest and which was suggested by Saul in the *British Medical Journal*, March 21, 1903, as distinguishing raw milk from boiled is that known as the ortol reaction. Ortol is well known to photographers, being ortho-methyl-animo-phenyl-sulphate mixed with quinol. The test is readily performed by adding a few granules of ortol to 5 cc. of the milk in a test-tube and then adding a few drops of a weak solution of peroxide of hydrogen, or, what answers equally well, a similar amount of ozonic ether as employed in the guaiac test for blood. If the milk is raw, a deep reddish-pink colour develops throughout the fluid in about half a minute. If the milk has been heated to 75° C. (167° F.) or over, no change in colour follows, or at most the production of a faint brownish tint. Many of the so-called sterilised or "Pasteurised" milks which have been heated only to 65° C. or 70° C. (158° F.) react to the reagent, so it is necessary to understand that this test does not distinguish raw milk from this Pasteurised milk, but only that which has been raised to a temperature higher than that at which Pasteurisation is usually carried on. The critical temperature is 75° C., at which the re-action ceases to be given.

The addition of acids does not alter the colour to any extent, but alkalies convert it into a pale coffee tint. Sour milk reacts as well as fresh. The reaction is lost, probably by the destruction of some ferment in the milk, which is rendered functionless at a high temperature. Saliva acts in the same way as raw milk, but if boiled first it fails to react with ortol. In human milk a similar colour change is brought about, but not so rapidly as in cow's milk.

Ledé describes in the *Ann. d'Hygiene Publique et de Med. Legale*, April, 1903, another method, practically based on an observation originally made by Babcock, of Wisconsin, in 1889. The addition of one drop of a diluted aqueous solution of hydrogen peroxide to a spoonful of fresh milk will produce free oxygen, and the presence of this can be easily demonstrated by adding a few drops of a solution of one or other of the many chemicals which change colour perceptibly in the presence of free oxygen, preferably potassium iodide and starch or paraphenylenediamine. If the milk has been previously heated above 176° F., no change of colour takes place; if not so heated, a dark indigo-blue is produced.

A New Test for Formaldehyde.—Manget and Maison recommend, in the *Ann. de Chimie analytique*, 1902, vii., p. 407, that the surface of the milk be lightly powdered over with amidol or diamido-phenol. After a few seconds, normal milk or that containing carbonates or borates assumes a salmon colour, whilst if formaldehyde be present a char-

acteristic canary-yellow colour is developed. For the detection of formaldehyde in the jelly of preserved meats a crystal of amidol is sufficient to be added to the melted mass. When the preservative is present a yellow colour, changing to a dirty chrome on the addition of ammonium hydroxide, is developed. Jelly free from formalin gives a rose-brown colour, changing to blue when treated in the same way.

The Mechanism of Agglutination.—We believe Bordet first suggested the close relationship between the phenomena of agglutination and coagulation; this view receives considerable support from some researches of Læwit (*Centr. f. Bacteriol.*, T. xxxiv., June 28, 1903, p. 156, and July 22, p. 251), who, exposing at 37° C. a mixture of plasma and serum of the goose and duck seeded with certain micro-organisms, observed the formation of a definite precipitate, giving the impression of an intense agglutination. On careful examination the precipitate appeared to be formed by a fine network, in the spaces of which one could see micro-organisms singly or in groups. These latter apparently play an important part in the production of the precipitate, as, if the mixture of serum and plasma be precipitated by the addition of dilute acetic acid, the precipitate be removed by centrifugalisation, and the clear liquid be realkalined, the addition of bacteria causes a re-precipitation. Læwit, in the face of these observations, regards agglutination as merely the mechanical entangling of micro-organisms in the meshes of a coagulum due to the action of the agglutinin of the serum upon the agglutinogene or agglutinable substance of the bodies of the bacteria. The precipitated material is amorphous, and owing to its refractile properties not easily seen by the microscope, but can be stained with methylene agar by Nocht's method. After centrifugalising, thoroughly wash the agglutinated bacteria with distilled water. Transfer to a glass slide and dry in the air; colour by pouring upon the dried specimen a few drops of Nocht's stain, heat gently until steam arises, wash in water, dry, and mount in balsam. The agglutinating substance appears then tinted blue or perhaps a reddish-violet. If to 2 cc. of Nocht's blue one adds three drops of a saturated solution of eosine, the mixture remains clear so long as kept stored in the dark. Rapid staining of the dried specimen with some of this mixed stain gives the agglutinating substance a rose colour and the enmeshed bacteria a blue tint, but this successful double staining is not always easy, as a few seconds too long a contact causes over-staining. The precise period of contact can be best learnt by practice only. If the precise nature of this phenomenon, as pointed out by Læwit, can be confirmed it would seem as if the reaction between the agglutinins of a serum and the agglutinable material of bacteria was of the nature of a true coagulation, of which the substratum is demonstrable as an amorphous mesh-work. Læwit gives a drawing of this substance, but his paper, though somewhat long, is well worth study *in extenso*, as it describes an absolutely original technique for the study of an hitherto unintelligible phenomenon.

Alcoholic Solutions of Disinfectants.—In an article in the *Arch. f. Hyg.*, Bd. xlv., Hft. 3, Engel showed that the action of alcoholic solutions of lysoform, sublamin and bacillol upon the hands was much more actively bactericidal than watery solutions of the same strength preceded by the

use of alcohol. In a later paper in the *Centralb. f. Bakt.*, Bd. xxxiii., No. 10, p. 786, he gives a series of tests on the comparative action of alcoholic and watery solutions of these and other substances on bacterial cultures. These indicate that under these conditions the bactericidal effects of alcoholic solutions are greater than aqueous solutions. The differences, however, are not sufficient to explain the marked divergences found in his original hand disinfection experiments. Engel's experiments support those of Fürbainger and some others which indicate the great value of alcohol for skin disinfection. The advantages on the side of alcoholic solutions is probably due to the solution of skin secretions and fatty matter by the alcohol, whereby the disinfecting agent is brought into intimate relation with the cutaneous structures. Some experiments which we have made ourselves are in accord with these views, in respect of alcohol as the vehicle for disinfectants, but more particularly emphasise the fact that the optimum concentration is 50 per cent. of alcohol.

Fleas and Plague.—The view originally put forward by Simond in the *Annales de l'Institut Pasteur*, xii., 1898, p. 628, that fleas travelling from rats which have died of plague may bite human beings and thereby disseminate the disease, has met with little favour among those who have closely investigated the malady. Simond maintained that his theory was confirmed by the presence of the specific microbe in the intestinal contents of the flea; by other peculiarities of transmission of plague from rat to man, and from man to man, in which latter case it is possible that other parasites, possibly the bed-bug, may intervene; by the possibility of the transmission of plague to a healthy rat by cohabitation with an infected rat having fleas, when such cohabitation of a healthy rat with an infected but flealess rat is uniformly negative. The great difficulty in the way of accepting Simond's theory has been the statement and belief that fleas from rats will not bite man. Dr. Tidswell, of Sydney, writing in the *Brit. Med. Journ.* of June 27, 1903, says that "Simond himself, whilst admitting his inability to pronounce upon the species of fleas found by him upon rats, nevertheless clearly states that they bit human beings upon whom they were placed." On the other hand, Valerio, of Lausanne, has reported that the species of flea found by him on rats are *Typhlopsylla musculi* and *Pulex fasciatus*, and that neither of them will bite man. Tidswell points out that Simond's observations were made in India and Valerio's in Europe, and it seems by no means improbable that their conflicting results were due to fleas found by them being of different species. It does not follow that the fleas harboured by rats in two widely different places would be exclusively of the same species. With a view to determine this point, Tidswell made a collection of fleas from rats coming under his notice during the recent epidemic of plague in Sydney. Of 100 fleas obtained, ten were identified as *Pulex fasciatus*, eight as *Typhlopsylla musculi*, six as *Pulex serraticeps*, and eighty-one as *Pulex pallidus*. It is noticeable that no less than four species were identified, and one, *P. pallidus*, most abundantly so, this being a species not hitherto identified or mentioned as occurring on ordinary rats. The common hosts of *P. pallidus* are *Mus. albipes*, of Socotra, and *Herpestes ichneumon*, of Egypt. Tidswell finds that both *P. pallidus* and *P. fasciatus* bite men, while *P. serraticeps* is well known to attack human beings. The remaining species, *T. musculi*, apparently will not bite man.

It is obvious that these observations remove an otherwise fatal objection to Simond's views and, if confirmed, constitute a valuable link in the chain of evidence as to dissemination of plague.

The Pathogenic Action of Radium Rays. — The effects of rays emitted from radium salts upon the skin of man are sufficiently known. Danysz, in *Comptes Rendus Acad. Sci.*, t. cxxxvi., p. 461, shows that if these salts be enclosed in a glass capsule or tube and be then placed upon the skin of a rabbit or guinea-pig, a definite destruction of the dermis results. A similar tube placed under the skin attacks the dermis in the same way, but without producing apparent lesions in either the adjacent muscular or connective tissues. It may also be introduced without inconvenience into the peritoneal cavity. On the other hand, the central nervous system, like the skin, appears to be very sensitive to the action of radium. One can rapidly cause the death of young animals by placing the same tube just over the spinal column. The effect becomes less marked as the animals grow, the osseous tissues develop and largely protect the nervous system from the rays of the metal or its salts. The larvæ of Lepidoptera are paralysed after a stay of twenty-four hours in the neighbourhood of a tube of radium, and die in two or three days. Cultures of anthrax bacilli are killed under the same conditions. Bohn, in *Comptes Rendus Acad. Sci.*, t. cxxxvi., p. 1,012, relates analogous experiments, in which he floated a sealed glass tube containing some bromide of radium on the surface of a bowl of water in which were embryos of frogs and toads. Some of these rapidly died, while those which survived developed so abnormally as to become monstrosities. These latter died also in ten days. Certain embryos of the sea-urchin, taken at different stages of their development, have been exposed by the same author (*ibid.*, p. 1,085) to radium rays. The blastula, if exposed to radium, did not develop into gastrula, so, too, gastrulation was either arrested or passed imperfectly into the pluteus stage. Under the influence of the same rays, eggs which had become fecundated gave irregular blastulæ, the spermatozooids are killed; somewhat old and non-fecundated eggs seemed to undergo a spurious fecundation and parthogenesis, giving rise to irregular embryonic forms (demi-morula). Bohn thinks that radium exercises an intense action upon tissues in which the cells have a tendency to active multiplication, and in individual cells, upon the chromatin of the nucleus. It is very desirable that these suppositions be confirmed histologically.

R. Pfeiffer and Friedberger enclosed a small quantity of radium bromide in a rubber capsule and placed it some three inches away from a gelatine plate containing colonies of enteric and cholera micro-organisms. The experiments (*Berl. Klin. Woch.*, July 13, 1903) were conducted in a darkened room, and after twenty-four hours gave negative results. The distance was then reduced to rather less than an inch, and in forty-eight hours' time a definite area was observed in which no further growth took place. To determine whether this had been due to some change produced in the culture medium by the action of the rays, the sterile area was again inoculated with a fresh enteric culture. An abundant growth resulted in thirty-six hours. Similar results were obtained with cultures of anthrax and cholera. Whether there is any absolute death of the bacteria or only an inhibition of their development is an undecided point, but these authors believe there is a favourable field afforded in the treatment of infectious processes of the skin, such as lupus, by the judicious employment of rays from radium salts.

Corps News.

EXTRACTS FROM "LONDON GAZETTES."

ARMY MEDICAL STAFF.

Col. W. L. Gubbins, M.V.O., Royal Army Medical Corps, to be Surg.-Gen., *vice* Sir W. D. Wilson, K.C.M.G., retained on the Active List as a Supernumerary to the Establishment, dated August 27, 1903.

ROYAL ARMY MEDICAL CORPS.

Lieut.-Col. A. Hewett retires on retired pay, dated October 17, 1903. He entered the Service February 4, 1877, and resigned his Commission August 31, 1878. He re-entered the Service as Surgeon March 6, 1880; was promoted Surg.-Major, March 6, 1892, and Lieut.-Col., March 6, 1900.

Major G. W. F. Long, from half-pay, to be Major, with precedence next below B. A. Maturin, dated October 6, 1903.

Major M. T. Yarr is seconded for Service on the Staff of the Governor of Bombay, dated October 9, 1903.

Lieut.-Col. W. O. Wolseley to be Col., *vice* W. L. Gubbins, promoted, dated August 27, 1903.

Lieut.-Col. A. T. Sloggett, C.M.G., to be Col., *vice* W. B. Allin, deceased, dated September 9, 1903.

Capt. E. Brodribb takes precedence next below F. J. C. Heffernan, and not as stated in *Gazette*, October 9, 1903.

ARMY MEDICAL RESERVE OF OFFICERS.

Lieut. J. T. K. Thomson, Glasgow Companies Royal Army Medical Corps (Volunteers), to be Surg.-Lieut., dated October 14, 1903, instead of as notified in the *Gazette*, October 13, 1903, under "Royal Army Medical Corps."

Surg.-Capt. C. A. Corke, 2nd Volunteer Battalion Worcestershire Regiment, to be Surg.-Capt., dated November 7, 1903.

Lieut. A. E. L. Wear, Royal Army Medical Corps Volunteers, to be Surg.-Lieut., dated November 7, 1903.

The undermentioned Surg.-Majors to be Surg.-Lieut.-Cols., dated November 11, 1903 :—

R. R. Brown, A. D. MacDonald, C. Arrol, W. J. Maismith, D.S.O., E. W. Symes, R. De La P. Beresford, C. W. Thorp, T. J. Aubin, R. B. Smith, R. T. Caesar, E. B. Reckitt, R. A. S. Daly, A. Chawner, E. J. Lawless, F. E. Fenton, F. L. Stevenson, R. L. Sparrow, F. J. Walker, W. C. Cowan, A. T. Wear, J. H. Maclean, W. Fergusson, W. L. Stewart, J. W. Hodgson, A. Lingard.

The under-mentioned Surg.-Capt. to be Surg.-Majors, dated November 11, 1903 :—

C. N. Lee, R. T. Meadows, J. G. Saville, G. M. Lowe, F. V. Adams, D. T. Key, E. H. Moore, R. J. M. Coffin, S. S. Hoyland, J. Adam, W. Kinnear, H. R. Bramwell, J. A. Rigby, J. T. Thomas, W. L. Edwards, H. J. Mackay.

The undermentioned Surg.-Lieuts. to be Surg.-Capts., dated November 11, 1903 :—

C. Boyd, J. Taylor, E. M. Callender, H. G. O. Collett, E. W. Livesey, J. P. S. Ward, J. S. Mackay, L. W. Pockett, R. T. Ferguson, C. G. MacLagan, J. M. Moir, W. A. Griffiths, R. H. Luce, A. H. Vernon, J. C. Wright, G. Melville, J. McMullen, D. R. Dobie, E. W. F. Mac W. Bourke, A. Henderson, E. E. Dyer, A. Y. Pringle, J. S. Swain, H. M. Brownfield, H. N. A. Taylor, T. F. Devane, A. Ehrmann, H. Fox, L. L. Hanham, A. Hilton.

Surg.-Lieut.-Col. C. M. MacQuibban, having attained the prescribed limit of age, is removed from the Army Medical Reserve of Officers.

VOLUNTEER CORPS.

2nd (the Weald of Kent) Volunteer Battalion the Buffs (East Kent Regiment).—Surg.-Lieut. J. L. Kerr to be Surg.-Capt., dated October 17, 1903.

1st Volunteer Battalion the Duke of Cambridge's Own (Middlesex Regiment).—Surg.-Lieut. T. S. Allen resigns his Commission, dated October 24, 1903.

1st Aberdeenshire Royal Garrison Artillery.—Surg.-Lieut. H. Mc I. W. Gray to be Surg.-Capt., dated October 31, 1903.

The Highland Royal Garrison Artillery.—Charles Gordon Mackay, late Lieut., to be Surg.-Lieut., dated October 31, 1903.

1st Surrey (South London).—Daniel Oliver Kerr to be Surg.-Lieut., dated October 31, 1903.

2nd Middlesex Royal Garrison Artillery.—Surg.-Lieut. E. A. Snape to be Surg.-Capt., dated November 7, 1903.

1st West Riding of Yorkshire (Sheffield).—Alan Charles Turner, Gent., to be Surg.-Lieut., dated November 7, 1903.

3rd Volunteer Battalion the King's (Liverpool Regiment).—Surg.-Capt. J. McMullen is retired under Para. 118 Volunteer Regulations, dated November 7, 1903.

2nd (Westmorland) Volunteer Battalion the Border Regiment.—Surg.-Capt. W. B. Cockill is borne as Supernumerary whilst commanding the Lancaster and Border Volunteer Infantry Brigade Bearer Company, dated November 7, 1903.

1st (Hallamshire) Volunteer Battalion the York and Lancaster Regiment.—Surg.-Lieut.-Col. J. W. Martin resigns his Commission, with permission to retain his rank and to wear the uniform of the Battalion on retirement, dated November 7, 1903.

William Smith Kerr to be Surg.-Lieut., dated November 7, 1903.

VOLUNTEER INFANTRY BRIGADE BEARER COMPANIES.

The Seaforth and Cameron.—Lieut. D. J. Kelly resigns his Commission, dated October 17, 1903.

5th London.—The announcements under the above heading which appeared in the *London Gazette*, July 28 and September 25, 1903, respectively, are cancelled.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

The Glasgow Companies.—William Adam Burns, Gent., to be Lieut., dated October 17, 1903.

MEMORANDA.

Lieut.-Col. J. E. Nicholson, Reserve of Officers, late Royal Army Medical Corps, is placed on retired pay, dated November 26, 1902.

IMPERIAL YEOMANRY.

East Riding of Yorkshire.—Richard Hamilton Ashwin to be Surg.-Lieut., dated October 17, 1903.

Scottish Horse.—David Mitchell Macdonald to be Surg.-Lieut., dated October 24, 1903.

Royal 1st Devon.—Francis Ernest Little, Gent., to be Surg.-Lieut., dated October 31, 1903.

Duke of Lancaster's Own.—Surg.-Lieut.-Col. W. W. Wingate-Saul retires under the provisions of Paragraph 54 Yeomanry Regulations, and is granted the honorary rank of Surg.-Col., with permission to wear the prescribed uniform on retirement, dated October 31, 1903.

3rd County of London (Sharpshooters).—Surg.-Lieut. E. M. Rooke resigns his Commission, dated October 31, 1903.

EXTRACTS FROM ARMY ORDERS.—A. O. 181 amends the Pay Warrant, especially as to officers serving in the Egyptian Army, in the following terms. To be substituted for Art. 474: 474. A medical or departmental officer who becomes medically unfit for duty, or supernumerary on reduction of establishment, or who is serving under the Egyptian Government, shall be dealt with, as

regards removal to half-pay and restoration to full pay, under the regulations applicable to combatant officers similarly situated, so far as they apply.

To be inserted after Art. 503: 503A. Each year or part of a year served in the district of Bahr-el-Ghazel, Kordofan, Sennar, Kassala, or Fashoda, by an officer holding an appointment under the Egyptian Government shall, if the officer has served in those districts for at least twelve months, reckon double towards voluntary retirement and all rates of retired pay, except the maximum rate of a lieutenant-colonel or colonel.

To be substituted for Art. 521 and 603A respectively: 521. On the completion of ten years from the date of an officer (other than an officer serving under the Egyptian Government or in our Royal Engineers) being seconded or lent to hold employment in any of the cases specified in Art. 77 (h) or (i), he shall, if he does not rejoin his regiment or corps, permanently retire from our Army. 603A. On the completion of ten years from the date of a medical or departmental officer (other than an officer serving under the Egyptian Government) being seconded or lent to hold employment in any of the cases specified in Art. 77 (h) or (i), he shall, if he does not rejoin his corps or department, permanently retire from our Army, receiving, subject to Art. 594, such rate of retired pay or gratuity as he may be entitled to by length of service.

A. O. 187 intimates that the revised schedules of hospital equipment promulgated by A. O. 50 of 1903 will apply only to hospitals with 100 beds or more. Hospitals with less than 100 beds should, for the present, be equipped in accordance with the schedules of hospital equipment referred to in A. O. 37 of 1898, but articles already issued to such hospitals under the most recent schedules should not be withdrawn, but treated as temporary issues in excess of schedule.

CORPS CASUALTIES.—During the period October 1 to November 10, the following casualties have occurred among our rank and file.

Discharges.—"By purchase": 18542 Pte. H. Byrne, 14536 Pte. F. F. Goodrich, 18665 Pte. G. E. Edward, 12780 Pte. W. Scott, 11943 Sergt. H. J. Copping. As "medically unfit": 11883 Pte. S. Sewell, 11219 Pte. W. Fowkes, 14876 Pte. T. P. Donovan, 15789 Pte. W. Wright, 17768 Pte. A. Jordan, 16992 Pte. W. H. Warwick. "To pension": 5215 1st Class Staff-Sergt. J. E. Scott. "After eighteen years": 11380 Pte. J. Nicholson. "1st period": 9394 Corpl. W. B. Banks; "Under Para. 1805 (23) K. R." 3856: Corpl. J. A. Smith.

Transferred to Army Reserve.—11335 Lance-Corpl. J. McGill, 15699 Pte. W. Stokes, 11671 Pte. F. Thompson, 14641 Pte. R. Raggett, 14646 Pte. W. J. Smith, 12642 Pte. J. T. Crouch, 14669 Pte. H. Lister, 14676 Pte. W. Diwall, 11931 Pte. R. Foddy.

Transferred to other Corps.—18871 Pte. H. Boundy to 13th Hussars, 9176 Lance-Sergt. F. Power to N.E. Dist. Co. of R.A.M.C. (Militia).

Embarkations.—For Malta: 9737 2nd Class Staff-Sergt. E. Bennett, 8283 2nd Class Staff-Sergt. W. E. Lowe, 9436 Sergt. L. E. W. Tempest, 10431 Lce.-Sergt. H. Underwood, 10407 Lce.-Sergt. J. Vickers, 8102 Lce.-Sergt. J. Davies, 8002 Lce.-Sergt. W. Martin, 11728 Lce.-Corpl. T. J. Jarvis, 11739 Lce. Corpl. J. Brean, 14643 Pte. F. C. Henry, 1153 Pte. G. Leach, 18378 Pte. E. Manley, 18194 Pte. A. W. Turner, 18465 Pte. A. Williams, 18049 Pte. O. G. Bloomfield, 17162 Pte. G. Rogers, 18056 Pte. E. Yates, 12418 Pte. W. G. Holden, 17006 Pte. R. Mair, 17727 Pte. A. Wrigley, 17728 Pte. T. Hynes, 17849 Pte. G. Blanks, 11834 Pte. G. W. Hillier, 15648 Pte. E. J. Hill, 18613 Pte. C. F. Grant, 18231 Pte. J. Barden, 17271 Pte. J. M. Todd, 18475 Pte. A. E. Gledhill, 17680 Pte. T. Leinham, 17452 Pte. H. Reynolds. For Gibraltar: 10950 Corp. H. Virgo, 17842 Pte. E. Ward, 17751 Pte. T. Swann. For Sierra Leone: 1866 2nd Class Staff-Sergt. W. E. Barber.

Disembarkations.—From Mauritius, 14959 Pte. P. G. Walton; from Malta, 8770 Pte. R. Wilson.

Deaths.—None.

LONDON COMPANIES R.A.M.C. (Vols.).—These Companies, under the command of Major V. Matthews, with the co-operation of the Electrical Engineers (R.E. Volunteers), did some interesting and thoroughly practical work on Wimbledon

Common on the night of October 17, the object being not only to accustom all ranks to night operations, but to test the value of the electric searchlight in finding wounded on broken ground.

It was presumed that a battle near Wimbledon Common had terminated late in the evening, and that wounded were lying about the Common. The night was particularly dark. The ground was systematically examined with the aid of a powerful electric searchlight. Immediately the stretcher squads had located the wounded, the light was, on signal, turned on to the adjoining portion of ground, and so on; the bearers dressing the cases by the light of bull's-eye lanterns, with which each squad had been provided. Thus the wounded were found and attended to with as little delay as possible. The few cases lying on open ground were, of course, found without any difficulty; but the majority had crept for shelter in a hollow (20 or 30 feet below the general level of the common), rather thickly covered with shrubs and trees, and about 200 yards from the position of the search light. The beam of light could not be thrown directly on this ground, but passed over it through the trees, the leaves of which, however, reflected sufficient light on to the ground beneath to enable the wounded to be found with comparative ease. Cases not lying beneath the trees were found with difficulty. Without the aid of the searchlight it would have taken some hours to find the wounded in this hollow; in fact, had any been insensible or unable to make themselves heard, they would probably have remained unfound till daylight. Collecting and dressing stations were found and indicated by white lights, four ambulance waggon being used to convey wounded. At the latter, necessary preparations were made by the Corps cooks for serving out beef-tea, &c.—a stove having been taken for the purpose. This stove was also used to supply tea to all after the operations were over. As regards the electric light plant, the officer commanding the Electrical Engineers writes that the engine is a 12-h.p. oil engine, the whole plant having been made for the Cape. It is portable, but "cannot dash about like a field gun." They were not used as portable engines at the Cape. The dynamo is on the engine's truck, and is direct-coupled. The projector (24") is the pattern used universally during the war, and had on this occasion (at Wimbledon) a diverging lens in front, which spread the light over 16°. It is mounted on a gun trail with two wheels. The cable is on a drum on an axle with two wheels, and will allow the engine to be 400 yards away from the light, so as to enable it to take cover. The whole is drawn by four horses, and a relief consists of six men.

A most successful Smoking Concert was given by the London Companies on Friday, October 30, to which all newly-entered students at the London Schools of Medicine were invited. The programme was varied by selections played by the Corps (R.A.M.C.V. London Companies) Band and the Imperial Orchestra.

THE GLASGOW COMPANIES (R.A.M.C.V.) — The beginning of the new volunteer year finds this Corps in the happy state of being up to full authorised strength. The First Aid Examinations for last squad of efficient has just been held, as also promotion examinations for promotion of Corporals to Sergeants. This season of the year is always known as the social season in our Volunteer Corps, and the annual gathering of the Corps takes place in the Empire Theatre, Glasgow, on December 11, when the distribution of Company and other prizes gained throughout the year takes place. The P.M.O. Scottish District has kindly consented on this occasion to give away the prizes. On this date also *The Annual* for the current year will make its appearance. The officers' annual mess dinner takes place on November 17; and a liberal programme of amusements in the shape of dances and other socials has been arranged by the Sergeants' Mess throughout the winter season. The Corps Swimming Club held their second annual competition lately, when the following won prizes: *High and Low Diving* (gold badge presented by Lieut.-Col. Beatson, C.B., V.D.), won by Sergt. W. B. Clarke. *Object Diving* (prize presented by Hon. Col. Bruce Goff, V.D.), won by Sergt. F. G. Dougall. *Novice Race* (prizes presented by the Adjutant), 1st, Pte. J. Lawrie; 2nd, Corpl. J. Stevenson. *Tub Race* (prize presented by Lieut. Edington), won by Sergt. F. G. Dougall. *One Length Race* (prizes presented by Major Somerville and Lieut. J. K. Thomson), 1st, Corpl. Renfrew; 2nd, Cyclist F. E. Ward;

Two Length Race (prize presented by Lieut. H. W. Thomson), won by Sergt. W. B. Clarke. *Four Length Race* (prize presented by Quarter-Masters), F. G. Dougall. *Consolation Race* (blindfold) (prize presented by Major McGregor Robertson), won by Corpl. H. S. Wishart.

NOTES FROM HONG KONG.—Lieut. Craig writes to say that the Corps cricket club in this garrison has taken a new lease of life under the energetic captaincy of Lieut. Harvey. It is in a flourishing financial condition, and a successful season is anticipated.

NOTES FROM SOUTH AFRICA.—Our correspondent writes that Lieut.-Col. Moberly and Capt. J. J. W. Morris have each been granted six months leave of absence, while Capt. Scarlett has rejoined from leave. Two cricket matches are reported from Potchefstroom; one between the Corps and the A.S.C., which ended in an even draw; and the other against the 8th M.I., which resulted in a win for ourselves by 44 runs. In the former, top scores were made by Corpl. Secker and Ptes. Manser and Hay. In the latter game, Pte. Sharples seems to have bowled with great success, taking 7 wickets for 6 runs.

From the *Transvaal Volunteer Gazette* of September 12, we see that No. 7079 1st Class Staff-Sergt. W. Higgins, R.A.M.C., has been taken on the strength of the permanent Staff Transvaal Vol. Med. Staff Corps. Also Lieut. and Quarter-master H. S. Brook is appointed Captain and Adjutant in the same. Both appointments will be welcomed by their old Aldershot friends.

THE GRAND SEPTON STEEPLECHASE.—This important handicap was run on November 12, at Aintree, and won by Surg.-Gen. Sir Thomas Gallwey's horse "Leinster," carrying 12st. 7lb., the top weight in a field of fourteen runners. The distance of the race was three miles, and we note that the horse started at the remunerative price of 6 to 1 against. We sincerely congratulate the popular Principal Medical Officer of H.M. forces in India on this sporting victory. We do not know whether "Leinster" will run in the Grand National or not, but if so, the Corps will watch the result of that cross-country journey with unusual interest.

EXCHANGES.—The following exchanges have been sanctioned: Lieut.-Cols. D. O'Sullivan and C. W. S. Magrath; Capts. A. E. Milner and G. A. Moore.

POSTINGS.—Lieut.-Col. A. G. D. Mosse to Southern District.

Lieut.-Col. C. W. Thiele to N.W. District.

Major S. G. Allen to Woolwich.

Major R. I. Power to Ireland.

Major G. B. Russell to Ireland.

Major T. Browning to Ireland.

Capt. H. W. K. Read to Ireland.

SERVICE ABROAD.—The following Officers have been warned for service abroad: Lieut.-Col. D. O'Sullivan; Majors J. C. Morgan and H. A. Cummins; Capts. A. E. Milner, J. G. Berne, K. M. Cameron, F. A. Symons, D. E. Curme; Lieut. H. A. Davidson.

ARRIVALS HOME ON LEAVE.—Lieut.-Col. E. R. Cree; Major A. L. Borradaile; Capts. J. I. W. Morris, H. S. Roch, E. McDonnell, H. H. Norman, A. D. Jameson, R. H. Lloyd, and J. W. H. Houghton.

ARRIVALS HOME FOR DUTY.—Lieut.-Cols. J. B. Emerson, J. R. Stuart and E. H. Lynden Bell; Majors G. B. Russell and H. M. Adamson; Capts. L. P. More and W. S. Harrison.

EMBARKATIONS.—To Malta: Colonel W. O. Wolseley; Lieut.-Col. R. Jennings; Majors W. L. Gray and H. M. Sloggett; Capts. C. B. Lawson and E. M. Williams; Lieut. J. H. R. Winder. To Gibraltar: Capt. E. Brodribb. To Sierra Leone: Major F. Smith and Capt. A. C. Fox.

APPOINTMENTS.—Surg.-Gen. J. A. Clery, C.B., P.M.O. II. Army Corps; Surg.-Gen. W. J. Charlton, P.M.O. IV. Army Corps; Surg.-Gen. W. L. Gubbins, M.V.O., P.M.O. Bombay; Col. G. D. N. Leake, to be an Administrative Medical Officer in India; Col. J. D. Edge, C.B., to be P.M.O. in S. Africa; Col. G. D. Bourke to be

P.M.O. Western District; Col. J. C. Dorman, C.M.G., to be P.M.O. Cape Colony; Col. E. H. Fenn, C.I.E., to be P.M.O. Bermuda; Col. W. O. Walseley to be P.M.O. Malta; Col. A. T. Sloggett, C.M.G., to be P.M.O. Home District; Lieut.-Col. J. J. Morris to be P.M.O. Southern District on promotion; Lieut.-Col. G. A. Hughes, D.S.O., to be P.M.O. Dublin District Staff.

Lieut.-Col. R. J. S. Simpson, C.M.G., has been appointed Staff Officer to the P.M.O. IV. Army Corps.

Capt. A. E. C. Keble has been appointed to the charge of the Military Families Hospital at Chatham.

The following officers have been appointed Specialists in Ophthalmology: Capt. H. V. Prynn, Woolwich and Thames Districts; Capt. F. M. Mangin, South-Eastern District; Capt. F. Kiddla, Western District.

Major C. W. J. Tatham has been appointed Sanitary Officer in the Western District, and Major A. Hosie in the Southern and South-Eastern Districts; Major F. Smith, D.S.O., on West Coast of Africa; Major W. L. Gray at Malta; and Major F. W. Hardy in Egypt.

Quartermaster and Hon. Lieut. F. Bruce has been appointed X-ray specialist at Dublin.

Capt. H. A. Berryman has been attached to the Guards for duty.

COLLEGE NEWS.—At the passing out examination (end of 3rd session), the following officers on Probation were awarded the prizes opposite their names:—

Lieut. A. C. H. Gray, R.A.M.C., Parkes Memorial Prize (First in Hygiene), Herbert Prize (best all round).

Lieut. F. W. Ellis, R.A.M.C., Second Prize in Hygiene (de Chaumont).

Lieut. F. M. G. Tulloch, R.A.M.C., Prize for first in Pathology.

Lieut. A. W. M. Harvey, I.M.S., First Montefiore Prize, First Military Surgery.

Lieut. W. E. J. Tuohy, I.M.S., Second Montefiore Prize, Second Military Surgery.

Lieut. R. Kelsall, I.M.S., Marshall Webb Prize, Military Medical Administration.

The junior class of instruction left the College for Aldershot and Netley on November 2.

The date of next entrance examination for commissions in the R.A.M.C. is fixed for the last week in January, 1904; the candidates to present themselves for physical examination on the 25th and following days.

THE SPECIAL CORPS DINNER.—At the General Meeting of the Corps held on June 16, a wish was expressed that we should entertain at dinner representatives of the civil profession, and that other distinguished gentlemen who have shown kindness to the officers of the Corps should also be invited. Arrangements were made accordingly, and the dinner took place at the Whitehall Rooms, Hôtel Métropole, on October 21. The guests present were: Right Hon. St. J. Brodrick, Sir W. Church, Sir E. Ward, Sir Joseph Fayrer, Sir H. Howse, Sir L. Ormsby, Sir F. Treves, Sir W. Turner, Sir W. Hooper, Sir W. Bennett, Sir C. Ball, Sir E. C. Perry, Sir A. Fripp, Sir J. R. A. Clark, Sir C. W. Bowdler, Col. Dunne, Col. J. E. Squire, Dr. J. Galloway, Mr. Howard Marsh, a representative each from the *Times* and the *Lancet*, and Dr. Creasy representing the *British Medical Journal*. The following had been invited, but were unable to be present: H.R.H. the Duke of Connaught, Earl Roberts, Dr. McCall Anderson, Dr. D. Cunningham, Dr. Haldane, Sir Halliday Croome, Dr. J. Little, Lieut.-Col. P. B. Giles and Lieut.-Col. A. Clark.

After the usual loyal toasts, the Director-General proposed the health of "Our Guests," which was responded to by the Rt. Hon. St. J. Brodrick, Sir W. Church, Sir W. Turner, and Sir L. Ormsby. The table was adorned with Mess plate belonging to the Corps, which had been lent from Aldershot and the Royal Army Medical College. A small string band selected from the Depot Band of the Corps played during dinner.

Some 154 past and present officers of the Corps had subscribed to this dinner; of these the following were present: Surg.-Gens. Sir W. Taylor, J. Jameson, Sir J. B. C. Reade, F. Bradshaw, W. H. McNamara, W. F. Stevenson, A. Keogh and A. Clery; Cols. Donovan, Gubbins, and James; Lieut.-Cols. Sloggett, Kirkpatrick, J. Anderson, H. R. Whitehead, G. W. Robinson, A. F. S. Clarke, J. F. Beattie, Gormley, Babbie, Bruce, R. Jennings, T. J. O'Donnell, Davies, Hubbard, Wilson, O'Brien, Pike, Skinner, Bartlett, Macpherson, MacNeece, Simpson, Hickson, Russell and Ford; Majors Heuston, Julian, McCulloch, Hearn, Meek, Kil-kelly, Ferguson and Moir; Capt. Heffernan, Mitchell, Goodwin, Milner, Berryman, Morgan, Pollock and Barnett.

LIEUT.-COL. BRUCE'S RECENT WORK IN UGANDA.—Our readers are aware that an accumulating mass of facts renders the belief possible that the cause of sleeping sickness is a trypanosoma parasite, carried from man to man by a variety of tsetse fly—*Glossina palpalis*. Arising out of the natural popular interest in the subject, there exists, unfortunately, some misconception as to the merit of the various persons concerned in this investigation. To *The Times* of November 19, Professor E. Ray Lankester contributes an important letter explanatory of the real facts. From it we make the following extracts:

"Col. Bruce, accompanied by Dr. Nabarro, reached Entebbe on March 16. There he was met by Major Greig of the Indian Medical Service. *The Times* leader says that Dr. Castellani, on the arrival of Col. Bruce and his party, was "able to submit to them evidence of a small protozoa (*sic*) known as a trypanosoma in the blood and spinal fluids of the affected persons." A misapprehension is likely to arise from this statement and indeed has arisen, as I will show below. The suggestion is that Dr. Castellani submitted this parasite, holding it to be the cause of the disease. Full credit is due to Dr. Castellani for his discovery of the presence of the trypanosoma, and has been given to him in no unmeasured terms by Col. Bruce in his official report to the Royal Society's Committee. But it is neither more nor less than the fact that Dr. Castellani came upon this trypanosoma on five occasions only in the cerebro-spinal fluid and once in the blood of sleeping-sickness patients, when looking for the streptococcus which he held to be the cause of the disease, and that he informed the head of the Medical Service of Uganda on the very morning of Col. Bruce's arrival in Entebbe that he regarded the trypanosoma merely as an accidental concomitant of the disease and as having no causal relationship to it. Dr. Castellani's attitude in this matter is stated in the official summary published in your columns at the same time as your leading article. On his return to England, which followed shortly after Col. Bruce's arrival in Entebbe, Dr. Castellani maintained in an official report to the Royal Society Committee (published some months ago) that the streptococcus to which he had originally committed himself was, though accompanied by the trypanosoma, an effective agent in the production of sleeping sickness."

* * * "The truth is that the importance of the occurrence of a trypanosoma in a few cases of sleeping sickness was apprehended by Col. Bruce and was not perceived by Dr. Castellani. It was Col. Bruce who immediately organised a thorough and successful search for the trypanosoma in all cases, and who, after Dr. Castellani's departure, by an energetic system of collecting the flies present in some hundred different localities around Entebbe, showed, firstly, that the fly *Glossina palpalis* is abundant, though partially distributed in that region; and, secondly, that where it occurs sleeping sickness occurs, and where it is absent sleeping sickness is absent. This was followed by direct experiments on inoculation by the fly." * * * "I should regret extremely were it to be supposed that I wish to detract from the merit which really belongs to Dr. Castellani. An investigator is always entitled to full credit for the discovery of a fact which proves to be one of great importance, even though he may not have fully appreciated that importance. Dr. Castellani discovered the presence of a trypanosoma in some cases of sleeping sickness: that is his merit. Col. Bruce would not have been able at once to pursue his investigations if Dr. Castellani had not ascertained the initial fact before the former arrived in Uganda. Possibly Col. Bruce would have himself come upon the trypanosoma after a few days' work in Entebbe."

Owing to its length, we have been unable to give Prof. Ray Lankester's letter in full, but these extracts speak for themselves. In congratulating our brother officer upon this fine piece of work, we feel that we are also congratulating the Corps; for, as one of ourselves, do we not consider that his work is our work? We hope that the example, set us in Malta, Zululand and Uganda, by Lieut.-Col. Bruce, may find many emulators in the R.A.M.C.

—*Cuncti adsint meritisque expectent præmia palmæ.*

BIRTHS.

ELSNER.—At Mian Mir, Punjab, on October 27, the wife of Capt. O. W. A. Elsner, R.A.M.C., of a son.

MARRIAGES.

SAFFORD—BADCOCK.—On October 28, at Dum-Dum, Bengal, India, by the Rev. — Cogan, D.D., assisted by the Rev. C. H. Barlow, M.A., vicar of Barrackpore, Arthur Hunt Safford, Capt. Royal Army Medical Corps, second son of Arthur Herbert Safford, to Dorothy Jeanne, elder daughter of A. P. Badcock. (By cable.)

STRATON—GOLDNEY.—At St. John's Church, Meerut, on October 17, by the Rev. W. Kitchin, Chaplain of Meerut, Capt. Charles Henry Straton, R.A.M.C., eldest son of Charles R. Straton, Esq., F.R.C.S., of West Lodge, Wilton, Salisbury, to Eleanor Grace, eldest daughter of the Rev. Samuel Goldney, of Kew, Surrey.

DEATHS.

DAVIS.—Surg.-Major-Gen. James Davis, late A.M.S., eldest son of Dr. W. A. Davis, of Newry, co. Down, Ireland, died on the 8th inst. at Broxholme, Waverly Road, Southsea, aged 63. He entered the Service in 1858, was promoted Surg. and Surg.-Major in 1873, Surg.-Major-Gen. in 1894, and retired on half-pay in 1895. He served with the 57th Regiment in the New Zealand War of 1861, and was present at the repulse of the attack on Camp Nukumaru and in the engagement at Kakamea, receiving the medal.

ANNOTATIONS.

THE ENNO SANDER PRIZE.—We have received from Major J. E. Pilcher, the Secretary of the Association of Military Surgeons of the United States, details regarding this prize for the ensuing year. The subject of the competition is "The Relation of the Medical Department to the Health of Armies." For the information of our readers we submit the following conditions of the competition:—

(1) Competition is open to all persons eligible to Active or Associate Membership in the Association of Military Surgeons of the United States.

(2) The prize will be awarded upon the recommendation of a Board of Award selected by the Executive Committee. The Board will determine upon the essay to which the prize shall be awarded, and will also recommend such of the other papers submitted, as it may see fit, for honourable mention, the author of the first of which shall receive a life membership in the Association.

(3) In fixing the precedence of the essays submitted, the Board will take into consideration—primarily—originality, comprehensiveness and the practicability and utility of the opinions advanced, and—secondarily—literary character.

(4) Essays will consist of not less than ten thousand, nor more than twelve thousand words, exclusive of tables.

(5) Each competitor will send three typewritten copies of his essay in a sealed envelope to the Secretary of the Association, so as to reach that officer at least one month before the next ensuing annual meeting, in the present case on or before September 10, 1904.

(6) The essay shall contain nothing to indicate the identity of the author. Each one, however, will be authenticated by a *nom de plume*, a copy of which shall, at the same time as the essay, be transmitted to the Secretary in a sealed envelope together with the author's name, rank and address.

(7) The envelope containing the name of the successful competitor will be

publicly opened at the next succeeding annual meeting of the Association, and the prize thereupon awarded.

(8) The successful essay becomes the property of the Association of Military Surgeons of the United States, and will appear in its publications.

The prize is a gold medal of the value of \$100, while the essayist securing second place will receive a life membership in the Association of the value of \$50. The Board of Award for 1904 are Lieut.-Col. J. S. Billings, U.S. Army, Brig.-Gen. G. R. Fowler, and Surg. H. G. Beyer of the U.S. Navy. Military and Naval medical officers of the British Services are eligible to compete. It may be mentioned that the award of this prize for 1903 was made to Major F. Smith, D.S.O., of the Corps, and a representation of the medal was given in this Journal in our issue of August last.

THE WOUNDED IN THE FIELD.—Lord Knutsford writes to the press, that the Central British Red Cross Committee have been charged with the duty of making known to the British public the existence of a fund instituted by H.I.M. the Dowager Empress Marie Féodorovna of Russia, for encouraging inventors and others to devise improvements in the means of dealing with wounded and sick in the field. The announcement of the foundation of this fund was made at the Seventh International Conference of Red Cross Societies held at St. Petersburg in May, 1902. The money set apart for the above object, and which is called the Empress Marie Féodorovna International Red Cross Fund, consists of a sum of 100,000 roubles (about £11,000) graciously presented by Her Majesty, the interest of which is to be expended every fifth year in prizes to be awarded at each successive International Red Cross Conference.

The prizes at the First Competition, which will take place in 1907 (country to be hereafter named), will be three in number. They will be awarded to competitors who submit, in whole or in part, the best solutions of problems connected with rendering aid to the wounded, whether on land or sea, and in the following directions: The surest and quickest means of searching for and removing the wounded from the field of battle; the best type stretchers or vehicles for moving the wounded to the dressing stations with the greatest rapidity and with the least degree of suffering; the means of saving lives at sea; the best installations in movable hospitals, waggons, ships, &c., for the final evacuation of wounded and sick.

The competition is an open one, and intending competitors are informed that they will have to send their inventions to the Exhibition of Ambulance Material, which it is proposed shall be held quinquennially in connection with the International Conference of Red Cross Societies. Further details can be obtained on application to the Hon. Secretary, Central British Red Cross Committee, 68, Victoria Street, London, S.W.

NOTICE TO SUBSCRIBERS.

THE Editor will be glad to receive original communications upon professional subjects, travel and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Major Pearse, Major Horrocks, Serg.-Major Tait, Capt. Longhurst, Capt. J. Powell, Major J. B. Wilson, Capt. E. A. Bourke, Major Gibbard, Lieut.-Col. Hackett.

The following periodicals have been received: *The Medical Record*, *The Medical News*, *New York Medical Journal*, *Gazette Med. de Paris*, *Il Morgagni*, *The Medical Review*, *El Siglo Medico*, *Der Militärarzt*, *Deutsche Militärärztliche Zeitschrift*, *Anales de Sanidad Militar*, *Revue Med. de la Suisse Romande*, *La Medicina Militar Española*, *The Boston Medical and Surgical Journal*, *Annali di Med. Navale*, *Giornale del Regio Esercito*, *Le Caducee*, *The Hospital*, *The Ophthalmoscope*, *The Asylum News*, *St. Thomas's Hospital Gazette*, *Bulletin de l'Acad. de Med. de Paris*, *Arch. Med. Belges*, *Voyenno Medisinskii*, *The Indian Medical Gazette*, *The Australasian Medical Gazette*; also "The Practical Study of Malaria" by J. W. Stephens and S. R. Christophers, from the University Press of Liverpool.

All Applications for Advertisements to be made to—
G. STREET & CO., LTD., 8, SERLE STREET, LONDON, W.C.

INDEX TO VOLUME I.

	PAGE		PAGE
Acetylene gas	151	Conolly, Lieut.-Col. J. B., birth of a	
Agglutination, mechanism of ..	502	son to	337
Albert Medal	68	Conservancy methods in India ..	58, 286
Alcoholic solutions of disinfectants ..	502	Cordite eating	277
Aldershot, notes from	336, 419	Corps casualties	507
Allin, Col. W. B., death of	337	„ news	66, 157, 243, 329, 416, 505
Alton, hospital at	248	Cottell, Major R. J. C., article by ..	292
Annual dinner of the Corps	69	Cranial depressions in new-born ..	151
Aorta, rupture of	149	Current literature, 61, 146, 231, 317, 406,	
Archer, Capt. E. J. S., birth of a			
daughter to	250		
Arm, gunshot fractures of	171	Davis, Surg.-Gen. J., death of	512
Army orders, extracts from ..	332, 418, 506	Dermato-myositis	320
Army surgeons in the past	111	Diabetes and fright	317
Ascarides as cause of typhoid condi-		Dinner, the annual	69
tion	408	„ the special	510, 336
Ash, Lieut.-Col. R. V., death of ..	423	Diphtheria bacillus, morphology of ..	325
Association of Military Surgeons,		Disinfectants, alcoholic solutions of ..	502
U.S.A.	81	„ standardisation of	152
Atropine, poisoning by	407	Distomum ringeri	497
		Dysentery bacilli, comparative study	
Babbie, Lieut.-Col., marriage of ..	423	of	436
Bacillus coli communis detection of	394	„ bacteriology of	425, 436
„ „ as evidence			
of water pollution	362	Elsner, Capt. O. W. A., birth of a	
„ dysenteriae	425, 436	son to	512
Band of the Corps	69	Endocarditis	406
Bermuda as a garrison	341	Enno Sander prize	68, 160, 512
Blood counts in tropical fevers ..	64	Enteric fever bacillus, detection of the	394
Brown, Capt. R. T., article by	425	„ „ in India	286
Bruce, Lieut.-Col. D., in Uganda ..	511	„ „ problem	54
„ Lieut. F., article by	92	Epithelioma of tongue	147
Buist, Capt. J. M., article by	286	Experiences, surgical	83, 423
		Experimental cancer	325
Caderas disease	414		
Carey, Surg.-Major, death of	163	Facial paralysis	319
Cava, obliteration of the superior ..	495	Faichnie, Major N., article by	261
Cheatle, G. L., article by	271	Fairland, Lieut.-Col. E., article by ..	211
Cholelithiasis	61	First line, medical service in the ..	292
Cogan, Lieut.-Col., death of	163	Firth, Lieut.-Col. R. H., article by ..	436
College news	67, 160, 248, 510	Fleas and plague	503
Collett, H. G. O., death of	337	Foot in relation to marching	411
Commission, Report of the Royal ..	401	Foreign garrisons, notes as to	338

	PAGE		PAGE
Fraser, Surg.-Gen., death of ..	163	Leprosy, cause of ..	163
Freeman, Major E. C., article by ..	341	Leukæmia ..	236
French army medical manœuvres ..	338	London Companies, the ..	347, 507
Fund, the South African ..	160, 259	Lougheed, Lieut.-Col. S. F., article by ..	104, 377
„ the R.A.M.C. ..	73, 164, 253, 337		
Gallie, Capt. J. S., marriage of ..	423	Macpherson, Lieut.-Col. W. G.,	
Gastritis ..	409	article by ..	459
Gazettes, extracts from the London,		Maidstone companies, the ..	161
66, 159, 243, 329, 416, 505		Malaria, gametes of ..	155
German regulations as to voluntary		Marching, the anatomy of ..	411
aid in war ..	459	Martinique, relief expedition to ..	41
Gibraltar, notes from ..	335	Mastoid operations ..	498
Glasgow Companies, the ..	508, 422	McArdle, Capt., article by ..	101
Goddard, Capt. G. H., marriage of ..	337	„ „ death of ..	71
Gonorrhœa, treatment of ..	410	Mechanism of agglutination ..	502
Green, Capt. S. F., birth of a son to ..	162	Military medical journals ..	138, 259
Gunshot wounds of skull ..	104, 307	Militia (R.A.M.C.) annual dinner of ..	82
„ „ spine ..	271	Milk, detection of boiled ..	500
„ „ thigh ..	261	„ „ formaldehyde in ..	501
Hare, Lieut.-Col. G., death of ..	423	Mobilisation ..	81
Hardy, Major F. W., birth of a		Nash, memorial to the late Surg.-Gen. ..	68
daughter to ..	250	National physique ..	221, 224
Hæmatoporphyrinuria ..	231	Nephritis, surgical treatment of ..	309
Heart, wound of ..	101	Neurectomy, a case of ..	32
Heat-stroke on the march ..	144	Nursing service, the ..	81, 163, 259, 339, 423
Herpes of the fifth nerve ..	146		
Historical retrospect of British army		Œdema, idiopathic ..	231
surgeon ..	111	„ traumatic ..	150
Hodgson, Capt. J. E., birth of a son to ..	337	Orders, army ..	245, 332, 418, 506
Hong Kong, notes from ..	509	„ of the Corps ..	72, 251
Horrocks, Major W. H., article by ..	362		
Howell, Capt. H. A. L., article by ..	111	Paraffin plugs in mastoid disease ..	498
Hoysted, Surg.-Gen. T. N., death of ..	251	Paralysis of fourth nerve ..	499
		Pasteur Institute, Kasauli, report	
Incontinence of urine ..	407	of the ..	125
India, notes from ..	335	Patterson, Lieut.-Col. T. W., death of ..	337
Injury to child during labour ..	321	Peard, Lieut.-Col., death of ..	251
Interstitial uterine pregnancy ..	497	Phlebitis ..	148
Intestinal strangulation ..	235	Pilcher, Capt. E. M., article by ..	171
Jennings, Major J. W., article by ..	277	Plague and fleas ..	508
Johnston, Lieut.-Col. W. T., birth of		Plastic operations ..	234
a son to ..	71	Pneumococcal infection ..	147
Kaffir medicines ..	338	Pneumothorax ..	320
Keble, Capt. A. E. C., birth of a son to ..	162	Pregnancy multiple ..	318
Kidney, injuries of the ..	495	Promotion examinations ..	67, 247, 332
Leeds Companies, the ..	250		
Leg, in relation to marching ..	411	Quill, Col. R. H., article by ..	306
L'Envoi ..	1	Quinine, poisoning by ..	306
Leishman, Major W. B., birth of a			
daughter to ..	71	Radium rays, action of ..	504
		Recruit, a plea for the ..	211
		„ physique of the ..	221, 224

	PAGE		PAGE
Refuse in camps, destruction of ..	237	Tenodesis	233
Relief expedition to Martinique ..	41	Tetanus	317
Retroversion of uterus ..	407	Thigh, gunshot fractures of the ..	261
Review of books ..	144, 315, 490	Tonsillotomy	61
Ribs, resection of ..	62	Transports, hospital arrangements on	5
Robertson, Brig. Surg., death of ..	163	Traumatic cedema	150
Roster for foreign service ..	245	Treatment of modern bullet wounds, review of	315
Safford, Capt. A. H., marriage of ..	512	Tsetse-flies, review of monograph on	490
Salisbury Plain, notes from ..	419	Tuke, Major G. J. A., death of ..	423
Sampson, Mr. R. G., death of ..	71	Tumours, the etiology of ..	140
Scarlet fever, bacteriology of ..	241	Tyacke, Capt. N., birth of a daughter to	71
Scott, Col. F. B., death of ..	71	Urinary analysis	191
Scottish district, notes from ..	336	Urotropine, value of	318
Sefton steeplechase ..	509	Vaccine lymph	217
Simple, Lieut.-Col. D., article by ..	125	„ report on preparation of ..	187
Severed fingers and toes ..	233	Venereal disease in Army ..	323
Sewage, standardisation of ..	238, 311	„ „ ocular manifestations of	36
„ empirical treatment of ..	311	Veronal	232
Sharpe, Major A., death of ..	423	Volunteer unit, work of, in camp ..	347
Simpson, Lieut.-Col. R. J. S., birth of a daughter to	71	War memorial fund	333
Singapore, notes from ..	420	„ Commission report	401
Skull, gunshot wounds of ..	104, 377	Water, purification of	63
Sleeping sickness	64	West Africa, notes from	420
Small-pox, etiology of	154	Will, Major J., article by	41
Soils of India	322	Winder, Lieut. H., marriage of ..	337
Sokoto expedition	331	Woolwich companies	335
South Africa, notes from ..	250, 509	„ notes from	336
Spine, gunshot injuries of	271	Wounded in the field	513
Squire, Col. J. E., article by ..	347	X-ray work in Ladysmith ..	92, 314
Stanistreet, Capt. G. B., article by ..	5	Yarr, Major M. T., article by ..	36
Statham, Capt. J. C. B., article by ..	191	Yeasts, therapeutic value of ..	487
Stevenson, Lieut. W. C., article by ..	32	Yellow-fever, the germ of ..	240, 327
„ Surg. Gen. W. F., article by ..	83		
Straton, Capt. C. H., marriage of ..	512		
Syphilis, micro organism of	326		
Taylor, Sir W., introductory article by	1		
„ „ „ on physique of recruit,	224		
„ „ „ prize, the	334		

4

27/11/22

UNIVERSITY OF MICHIGAN



3 9015 07303 4384



